

APRIL, 1958

# AMATEUR RADIO AMATEUR RADIO AMATEUR RADIO AMATEUR RADIO

# AEGIS

TESTED  
COMPONENTS

Made in Australia

FOR AUSTRALIAN CONDITIONS!

## ● HIGH-FIDELITY EQUIPMENT

### AEGIS FIDELITY TUNER Mark 2

Latest model with ventilated shield, satin-gold backed plastic front and symmetrically placed knobs. Power supply drawn from existing power amplifier, preferably the Aegis "5-10". Retails at **£32/17/6**



Also AEGIS Hi-Fi TUNER Mark 1 with own power supply ..... **£35**

### AEGIS Mullard "5-10" Hi-Fidelity AMPLIFIER

Rated power output 10 watts (maximum 12-13 watts). Frequency response plus or minus 0.5 db., 10 c/s. to 20,000 c/s. Control panel: 12" x 3" x 1 1/2". Amplifier 11 1/4" x 6 1/2". New Retail Price now **£49/10/-**



Also AEGIS "5-10 PLUS" HI-FI AMPLIFIER ..... **£74/5/-**

## ● TELEVISION

### AEGIS POWER-LEAD T.V. FILTER

FILTERS OUT ELECTRICAL INTERFERENCE at T.V. frequencies!

Type LF-1TV: Rating 240v.—2a. maximum (500 watts). Tested under exacting conditions and proved thoroughly reliable. May be used with appliances fed from two or three core power leads. Retails at ..... **£2**



ALL AEGIS T.V., HI-FIDELITY and RADIO COMPONENTS available at ...

## J. H. MAGRATH & Co. Pty. Ltd.

208 LITTLE LONSDALE STREET, MELBOURNE, VIC.

Phone: FB 3731

# AMATEUR RADIO

1/6



# "HAM" RADIO SUPPLIERS

(KEN MILLBOURN, PROP.)

## 5A MELVILLE STREET, HAWTHORN, VICTORIA

North Balwyn Tram Passes Corner, near Vogue Theatre.

Phone: WM 6465

Money Orders and Postal Notes payable North Hawthorn P.O. Packing Charge on all goods over 10 lbs. in weight, 5/- extra.

## NOTE THESE VALVE PRICES

Look at these Bargain Priced NEW VALVES—

1A5	5/-	6J5GT	7/6	7F7	5/-	830B	20/-
1B5	2/6	6K6	7/6	7N7	5/-	954	5/-
1K4	5/-	6K7G	5/-	7W7	2/6	955	5/-
1K5	2/6	6L7	10/-	12AH7	7/6	1626	5/-
1M5	5/-	6N7	10/-	12H6	7/6	1629	5/-
1P5	5/-	6N8	15/-	12J5	7/6	1851	5/-
1Q5	5/-	6S7	10/-	12SA7	10/-	100TH	35/-
1R5	10/-	6SF7	12/6	12SF7	10/-	AV11	2/6
1S5	10/-	6SH7G	4/-	12SG7	10/-	CV66	5/-
1T4	10/-	6SJ7GT	12/6	12SJ7	10/-	EA50	2/6
2A5	10/-	6SK7GT	12/6	12SK7	10/-	RK34	5/-
2X2	7/6	6U7	10/-	12SN7	12/6	VR99	15/-
3Q5	5/-	6SH7G	4/-	12SQ7	2/6	VR100	5/-
6AG5	10/-	6V6GT	12/6	12SQ7GT	2/6	VR101	5/-
6AJ5	10/-	7A6	5/-	12SR7	5/-	VR102	5/-
6B4	12/6	7A8	3/6	45	5/-	VR103	5/-
6C8	7/6	7C7	2/6	807	20/-	VR150	12/6
6E5	10/-	7E6	3/6	815	35/-	VT50	2/6
				829B	£5	VT52	10/-

C.R. Tubes—5FP7 (U.S.A. 5FP1)

1C7	3/-	each or 7 for	£1	12SF7	10/-	each or 3 for	£1
2X2	7/6	each or 3 for	£1	CV66 (RL37)	5/-	ea. 5 for	£1
6AC7	3/11	each or 7 for	£1	EA50	2/6	each or 10 for	£1
6H6Gs	£1	a dozen		EF50	3/6	each or 7 for	£1
6K7G	5/-	each or 5 for	£1	EF50 valve sockets,	3/6	ea.	
6SH7	5/-	each or 5 for	£1	RK34	5/-	each or 5 for	£1
6SH7GT	4/-	each or 6 for	£1	VR57/EK2	10/-	each	
7C7	2/6	each or 10 for	£1	VT501	7/6	each or 3 for	£1
7F7	5/-	each or 5 for	£1	VT127	4/11	each or 5 for	£1
954, 955	5/-	ea. or 5 for	£1	Local valve sockets,	1/6	ea.	

New Valves—VR53/EF39, direct replacement for 6U7. High gain, low noise. 5/- each or five for £1.

## THIS MONTH'S SPECIALS

MIN26C Radio Compass Receivers, 150 to 1500 Kc., 112 Kc. I.F. Two only. New condition. 24 volt operation.	£17/10/0
24 volt to 230 volt A.C. Inverters, approx. 50 watts	£10
6SN7GT Valves, new	12/6 each
4A6 Lighthouse Valves	15/- each
1R5, 1R5, 1T4 Valves, new	10/- each

U.S.A. I.F.F. Units, complete with Valves and Genemotor, £5/17/6. Less Genemotor, £4/17/6.	
Four-Gang Condensers, approx. 150 pF. per section	£1
Single Gang Condensers, 0.004 capacity, Ceramic	10/-
Midget Ceramic Trimmers, 3 to 55 pF.	1/-
Teletone Octal Valve Sockets	1/- each
Shielded Wire, single, American	1/6 yard
Meters—0.35 and 0-1 Amp. R.F., F56 and 101 type	10/- ea.
Meters—0.500 microamp., 13" diam., flush mounting	30/-
Meters—0.30 Ma., 2 1/2" round type, American	40/-
Meters—0.100 Ma., 2" square, scaled 0-300, new	£1
Meters—0.40 amp. A.C. 2 1/2" round type	25/-
Meters—0.20v., A.C. 2 1/2" round type, new	25/-
Relays—S.P.D.T., 24 volt, 3,500 ohms	7/6
S.P.D.T., 24 volt, 6,500 ohms	7/6
12 volt, 250 ohms	7/6
P.M.G. Type, 500 ohms	7/6
P.M.G. Type, 500 plus 500 ohms	7/6
W.I.A. Latest Call Books and Log Books always on hand.	

American Loran Receiver R9A-APN4, 16 valves. Part of Loran Indicator. Equipment contains 3 6B4s, 1 5U4, 1 VR105, 2 2X2s, 1 6SJ7, 4 6SK7s, 1 6H6, 1 6SN7, 1 6SL7, 1 6SA7, lots useful parts. New in case. No packing charge. Gift at £7/10/-

SCR522 American Transceiver. Frequency: 100 to 150 Mc. In clean condition, less valves	£10
SCR522 Receivers, less valves	£5
SCR522 Transmitters, less valves	£5
BC733D Crystal Locked Receiver, tuning range 108-120 Mc. I.F. 6.9 Mc. Valve line-up: three 717As, two 12SG7s, one 12SH7, two 12SR7s, one 12SQ7, one 12A6. Also contains six miniature relays. Packed ready for rail. Gift at £5/17/6	
108 Mark III. Portable Transceiver, complete with valves, less headphones, aerial and microphone	£27/10/0
Aust. Wavemeter, Type AWB1, high freq., 145-165 Mc. approx. Valve line-up: 958 diode, connected into two type 1N3s cascade connected. D.C. amp., complete with spare set of valves and 3" 0-1 Ma. meter. Circuit enclosed. Contained in flat grey metal carrying case. Packed ready for rail.	£5/17/6
Co-ax Cable, 50 ohm, any length	2/- yard
Co-ax Cable, 80 ohm, in 100 yard rolls	£7/10/0 per 100 yard roll, or 1/9 yard.
Co-ax Cable, 100 ohm, any length	2/- yard
Co-ax Plugs and Sockets, American Ampenol	5/- pair
Co-ax Right-Angle Plugs, American Ampenol	2/6 each
Command Receiver Right-Hand Drives	2/6
Command Receiver Flexible Drives, 12 ft. long	10/-

## LARGE STOCK OF CRYSTALS

915 Kc. and 455 Kc. Crystals	£3 each
3.5 Mc. Marker Crystals, latest miniature type complete with socket	£2/10/-
Amateur Band Crystals, any frequency	£2
Gold Plated Marker and Commercial Crystals, price on request. Delivery in seven days.	

List of Crystal Frequencies appeared in February advert.

No. 19 Genemotors	£2/10/0
No. 11 Genemotors, Low Power	£2
No. 11 Genemotors, High Power	17/6
AR8 Vernier Dials, Low and High Frequency Bands, new 30/-	
Calibrated Perspect Dials only	5/-
APX1 12v. and 24v. Shunt Motors, ideal for Small Beams. Works on A.C., new	£1/10/0
APX1 Chassis, top deck, containing 28 Miniature Ceramic 7-pin Valve Sockets, Condensers, Resistors, etc., etc. A good buy at	£2/5/0; postage 5/- extra
Screwdriver Roll-up Kits, well known make. Contains three Standard, two Recessed Screwdrivers, Bargain	15/-
P.M.G. Key Switches, two-way	10/0
AR8/AT5 Cables, 12 ft. long	10/0
Type "S" Power Supply, 230 volt AC. Good condition. Personal Shoppers only	£25
AT21 Power Supply, 230 volt AC. Good condition	£25
Genemotors, Windcharger, 19v. 3.8 amp. input, output 45v. 0.095 amp. When 12v. input applied, 250v. output. £3/5/0	
English Filter Chokes, small type, 40 Ma., 100 ohm resist. 3/6	

# AMATEUR RADIO

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

## EDITOR:

J. G. MARSLAND, VK3NY.

## TECHNICAL EDITOR:

K. E. PINCOTT, VK3AFJ.

## NOTES EDITOR:

V. M. JONES, VK3YE.

## TECHNICAL STAFF:

J. C. DUNCAN, VK3VZ.  
D. A. NORMAN, VK3UC.  
R. S. FISHER, VK3OM.

## ADVERTISING REPRESENTATIVE:

BEATRICE TOUZEAU,  
96 Collins St., Melbourne, C.I.  
Telephone: MF 4505.

## PRINTERS:

"RICHMOND CHRONICLE,"  
Shakespeare St., Richmond, E.I.  
Telephone: JB 2419.

MSS. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," C.O.R. House, 191 Queen Street, Melbourne, C.I., on or before the 8th of each month.

Subscription rate in Australia is 18/- per annum, in advance (post paid) and £1/1/- in all other countries.

Wireless Institute of Australia  
(Victorian Division) Rooms' Phone  
Number is MY 1087.

## WI BROADCASTS

All Amateurs are urged to keep these frequencies clear during, and for a period of 15 minutes after, the official Broadcasts.

**VK3WI:** Sundays, 1100 hours EST, 7146 Kc.; 1930 hours EST, 144 Mc. No frequency checks available from VK3WI. Intra-state working frequency, 7050 Kc.

**VK3WI:** Sundays, 1130 hours EST, simultaneously on 3573 and 7146 Kc., 57.5 and 148.25 Mc. Intra-state working frequency 7135 Kc. Individual frequency checks of Amateur Stations given when VK3WI is on the air.

**VK4WI:** Sundays, 0900 hours EST, simultaneously on 3580 and 14342 Kc. W.I.A. Country Hook Sunday mornings 0900 hours. Please call VK4ZM on 20 mx. and VK4WI on 40 mx. Sunday night re-broadcast of the news on 80 mx at 2100 hours, conducted by VK4WI.

**VK5WI:** Sundays, 1500 hours EAST, on 7146 Kc. Frequency checks are given by VK5MD and VK5WI by arrangements on all bands to 56 Mc.

**VK6WI:** Sundays, 0930 hours WAST, on 7146 Kc. No frequency checks available.

**VK7WI:** Sundays at 1000 hours EST, on 7146 Kc. and 3572 Kc. No frequency checks are available.

**VK8WI:** Sundays, 1000 hours EST, simultaneously on 3.5, 7, 14 and 144 Mc. bands. Individual frequency checks of Amateur Stations given when VK8WI is on the air.

Published by the Wireless Institute of Australia,  
C.O.R. House, 191 Queen Street,  
Melbourne, C.I.

## EDITORIAL



### Is the Australian Amateur Abreast with Communication Progress?

Let us first of all define what we mean by "Communication Progress" based upon general developments in the world of commercial and Amateur communications.

Receiver design,  
Transmitter design,  
Modulation techniques,  
Pulse techniques,  
Antenna design,  
Propagation problems,  
Television,  
Instruments.

Generally speaking the nature of items published in the magazine of any organisation reflects the thoughts and interests of members. Probably because our members are Amateurs much of the good work done does not reach the pages of our magazine due in some cases to fear of criticism and in others to the "leave it to the other fellow" attitude characteristic of Australians generally; however, those subjects which have been covered in the magazine indicate that interest in new techniques is well maintained.

The nature of technical lectures given at Institute meetings and the interest taken therein is another means of gauging the technical progress of members.

Yet another way of assessing the technical standards and interests of Radio Amateurs is to listen on the bands to the ideas being exchanged thereon and the discussions which follow.

The advent of Limited A.O.C.P. gave great impetus to u.h.f. and v.h.f. activities, because it brought into the fold many men who are interested in technical progress rather than communication for the purpose of earbashing or DXing.

It is a long time since the Institute conducted a full scale exhibition, but we are confident that if such an exhibition is held the quality and modernity of Ham gear would offer visible proof of the Amateur's ability to keep abreast with new techniques, both theoretically and practically.

We are firmly convinced that at present the answer to the question posed in our title is emphatically yes, however in the future the answer will depend upon the maintenance of a steady stream of recruits to our ranks.

Realising that the best way to ensure fulfilment of our hopes is to encourage every potential Amateur into the fold not only by extending a helping hand but also by giving him or her the opportunity of obtaining practical experience.

With this in mind your Executive has assiduously pressed for issue of "Novice" licence. Our reasons are not altogether selfish, a fact that is borne out by the support we have received from the Defence Services, who realise that in an emergency the Amateur is a trained specialist capable of immediate assimilation into the communication branch.

FEDERAL EXECUTIVE.

## THE CONTENTS

Propagation Studies on 3.5 and 7 Mc.	2	National Field Day Results	12
Book Review:		DX	13
"TV Fault Finding"	3	Prediction Chart for April, 1958	13
"An Introduction to the Cathode Ray Oscilloscope"	3	V.H.F.	14
Amateur Television, Part Two	4	Correspondence	16
Small Ship in Distress—VK7AJ		S.W.L.	16
Initiates Rescue	9	YL	16
1957 VK-ZL DX Contest Results	12	Notes	17
W.I.C.E.N. Notes		Contest Calendar	17
		DXCC Listing	17

# Propagation Studies on 3.5 and 7 Mc.

BY HANS J. ALBRECHT\*

THE International Geophysical Year having commenced in July 1957, all sections of Geophysics experience a period of considerable activity. Many scientific organisations and institutions co-operate on an international basis in an enormous effort to obtain research results on geophysical phenomena. On the other hand, the huge continent in the south, Antarctica, is being investigated systematically by expeditions of many nationalities.

In ionospheric research, one of the particularly important items on the I.G.Y. programme is a thorough investigation of ionospheric propagation in all possible frequency ranges. In the case of the sporadic E-layer, for instance, observations on frequencies of the order of 50 Mc. are thought to be conclusive for research on the movement of sporadic-E clouds. In addition, data are collected on the origin of sporadic E-ionization, and its regularity and predictability, if any.

Another branch of propagation research refers to the so-called scatter propagation. A lot of work is yet to be done in this field but, nevertheless, a development of great significance appears to be ionospheric scatter communication in the v.h.f. range, admittedly somewhat expensive, but consistent and relatively dependable.

With regard to long-distance propagation on frequencies between 3 and 30 Mc., it may be said that the control-point concept of great-circle propagation is sufficiently accurate for all practical purposes. This means that the opening of a certain band to one or the other continent can be predicted with reasonable accuracy, on a monthly basis, by choosing control-points along

the great-circle path, one each approximately 1,250 miles from either end. The critical frequencies at these points, multiplied by the m.u.f. factors, then indicate two values of m.u.f., the lower of which being regarded as the m.u.f. of the path. It has been proved statistically that, for generally useful predictions, the behaviour of the ionosphere between these control-points is not of appreciable significance.

On the other hand, it is of great scientific interest to have some information on the actual path taken by the signal. A well known theory assumes multiple hops between the ionosphere and the earth's surface, although there has always been reason to believe that this concept is rather debatable.

## NEW METHOD OF PATH ANALYSIS

During the last few years, the author developed a new approach to propagation analysis, based on his ionospheric observations at Box Hill, Vic., and published it in his capacity as I.G.Y. research consultant, Mediterranean Area<sup>(1)</sup>. The new method may briefly be described as follows: "Path Attenuation" being the attenuation a signal experiences on its path along the great circle, this quantity may be measured if the actual transmitting power and the signal strength at the distant receiver are known. The amount of this path attenuation depends on the distance, on the absorption along the ionospheric path, and on losses at earth-reflection points, if any. Careful selection of operating time and frequency allow a practical elimination of effects of the second factor, the ionospheric absorption. Furthermore, the decrease in strength due to distance may be taken into account by calculations. Thus the residual path attenuation measured is

an indication of earth-reflection losses along the path.

However, the interpretation remains clear only if certain theoretical aspects are considered. Details being beyond the scope of this contribution, it may just be mentioned that the operating frequency mainly used by the author was 3.5 Mc. and a minimum distance of the order of 10,000 miles was found to be essential. The new method<sup>(1)</sup> may be utilised either passively (receiver only) or actively (with receiver and transmitter). With the latter method the author of course restricted himself to normal Amateur DX communication within the 3.5 Mc. band. Emphasis being laid on signal strength reports and transmitting power on both sides, a large amount of observational data was collected during the period of about three years up to 1957.

As is to be described further below, applying this method of path analysis the author found a new hypothetical theory of chordal propagation, the chordal-hop theory<sup>(1)</sup>.

## AMATEUR REPORTS

As is known to all readers of the DX page at that time, reports on the times of band openings were always particularly welcome. These times served an entirely different purpose, namely the comparison with the times predicted, as has been mentioned and analysed in a previous article in this journal<sup>(2)</sup>.

Expressing once again his appreciation of the excellent co-operation of VK Amateurs, the author wishes to emphasise here, as he has done wherever possible and advisable, that serious Amateur reports are of great scientific value. This is undoubtedly the field where Amateurs are in a unique position to prove the justification of their existence in the light of international conferences on frequency distribution, etc. In all corners of our globe, one can presently find Radio Amateurs making their contributions to the I.G.Y., particularly by observing sporadic-E breakthroughs on v.h.f. and by assisting in the electronic satellite observation. Summarised and analysed accordingly, as described previously<sup>(2)</sup>, Amateur reports are, in general, a very useful basis for scientific investigations.

## CHORDAL-HOP THEORY

Referring again to the new approach to path analysis, the author found that, on the average, the amount of path attenuation was identical to that determined by theoretical calculations, without the losses due to earth-reflections. It was thus concluded in<sup>(1)</sup> that, within reason, there is no direct proof for multiple-hop propagation between ionosphere and the earth's surface.

Looking for a theory of propagation which could replace the old multihop concept, the author calculated so-called "path diagrams" which display the behaviour of the ionosphere along the great-circle path under investigation. Thus he found that, within 600 to 1,250

\*Haldenhof 7, Schramberg-Sulgen, Württemberg, West Germany.



## VACUUM MOUNTED CRYSTALS

for general communication frequencies in the range 3-14 Mc. Higher frequencies can be supplied.

### THE FOLLOWING FISHING-CRAFT FREQUENCIES ARE AVAILABLE IN

FT243 HOLDERS, 6280, 4095, 4535, 2760, 2524.

### ALSO AMATEUR TYPE CRYSTALS—3.5 AND 7 Mc. BAND.

Commercial—from £3/15/6 each, plus 12½% Sales Tax.

Amateur—from £3 each, plus 12½% Sales Tax.

Regrinds £1/10/-.

CRYSTALS FOR TAXI AND BUSH FIRE SETS ALSO AVAILABLE.

We would be happy to advise and quote you as to the most suitable crystal for your particular application, either in the pressure or vacuum type holders.

New Zealand Representatives: Messrs. Carrel & Carrel, Box 2102, Auckland.

## BRIGHT STAR RADIO

46 Eastgate Street, Oakleigh, S.E.12, Vic.

Phone: UM 3387





miles of each end of the path, there exists a more or less steep change in the height of the F<sub>2</sub>-layer. It may be pointed out that, due to 3.5 Mc. being the operating frequency, DX communication is of course only possible when the ionisation of the other layers is so small that absorption can almost be neglected for the purpose of this path analysis. In consequence to relevant calculations, it may be assumed that, for instance for the path Eastern Australia-Western Europe at 1900 GMT, February 1954<sup>(3)</sup>, a transmission angle of the order of 5° resulted in the ray experiencing an additional upwards bending at the first ionospheric reflection point caused by the inclination in the layer. Briefly, such an inclination, in addition to a change in the refractive index along the path, results in a propagation path of the form of geometrically inscribed hops or, better, "chords" of the layer, as shown in Fig. 1. Based on certain theoretical

considerations<sup>(1)</sup> the chordal-hop path consists of a number of ionospheric reflections without the appropriate number of reflections at the earth's surface. In other words, the ray may be reflected along the ionospheric layer without touching the ground again before other corresponding inclination and refraction conditions cause it to be bent down at the correct distance from the receiving point.

There is every indication that this theory not only holds for frequencies near the lowest-usable-high-frequency (l.u.h.f.), as 3.5 Mc., but also for higher frequencies as long as propagation takes place via a layer. The author also found similar conditions with 7 Mc. DX communication during the same period.

In conclusion, it may be stressed that conducting this propagation research from Australia proved to be very advantageous, because propagation to two continents easily workable on

3.5 Mc., namely, North America and Western Europe, obeys representative and consistent rules under undisturbed conditions. It is very doubtful whether such experiments would have been equally successful from other points of the globe.



Fig. 1—Principle of chordal-hop theory. Path from A to B: Minimum height of layer: ——— (Sketch only, not drawn to scale.)

#### REFERENCES

- (1) Hans J. Albrecht, Investigations on great-circle propagation between Eastern Australia and Western Europe. *Geofis. p. e. appl.*, Vol. 38, p.169-180 (1957).
- (2) Hans J. Albrecht, Analysis of world-wide ionospheric propagation to and from Australia, 1953-54. "A.R." Vol. 24, Nr. 10 (1956).
- (3) Hans J. Albrecht in "DX-Activity," "A.R.," Vol. 22, Nr. 4 (1954).

## AMATEUR RADIO SERVICE

### A NEW SERVICE TO THE AMATEUR including—

- ★ Modifications to and the re-building of all types of Surplus Equipment to your own specifications.
- ★ Service to all types of receiving and transmitting equipment.
- ★ The construction of Amateur equipment to your own specifications, such equipment includes: Receivers and Transmitters both H.F. and V.H.F., All-Band Converters, V.H.F. Converters, Exciters, Receiver Front-ends (single channel or multi-band), Mobile Transmitters and Receivers or Converters, Modulators, Power Supplies, Frequency Meters, "Q" Multipliers, Pre-selectors, Aerial Couplers, etc. In fact anything you may require in the Amateur field can be made to order.
- ★ Should you have the materials for that certain project, but do not have the time or are so placed that you are unable to complete the job, drop us a line and we will be pleased to assist.

ALL WORKMANSHIP OF THE HIGHEST GRADE AND GUARANTEED.

For further details write to—

## AMATEUR RADIO SERVICE

605 ABERCORN ST., ALBURY, N.S.W. Phone: Albury 1695

## BOOK REVIEW

### "TV FAULT FINDING"

This book, as its name implies, is written for the person who has to find faults in t.v. sets and by means of profuse illustrations of almost every conceivable fault, does just that.

It has been assumed that the reader has a basic knowledge of television theory and practice and by means of this book he should be able to recognise the characteristics of the fault in his t.v. set, and by using the fault-finding guide and profuse illustrations, put his finger on the fault.

It must be remembered that this book deals with the English positive modulation of the picture and amplitude modulation of the sound, but nevertheless only a small amount of the fault finding data will not apply to our Australian system.

We recommend this book as a handy reference on t.v. fault finding.

Our copy from Data Publications Ltd., 57 Maids Vale, London, W9. Price 5/- sterling.

### "AN INTRODUCTION TO THE CATHODE RAY OSCILLOSCOPE"

By Harley Carter, A.M.I.E.E.

This book is another of the popular Philips Technical Library series and is written for the person who has only a nodding acquaintance with oscilloscopes.

It deals with the basic construction of the cathode ray tube, following with time base circuits, saw tooth linearity, and finally with amplifiers and power supplies for the oscilloscope.

No attempt has been made at mathematical treatment, the aim being to educate in a general way.

Circuits of four complete oscilloscopes are included together with examples of practical applications of the instrument.

This book is distributed in Australia by Philip Electrical Industries, 69-73 Clarence St., Sydney. Price 12/6 Sterling.

## Duralumin Aluminium Alloy Tubing for Radio Aerials

★ LIGHT ★ STRONG ★ NON-CORROSIVE  
STOCKS NOW AVAILABLE FOR IMMEDIATE DELIVERY

ALL DIAMETERS— $\frac{1}{4}$ " TO 3"

RECOMMENDED FOR TELEVISION AND BEAM AERIALS

Price List on Request

STOCKISTS OF SHEETS—ALL SIZES AND GAUGES

## GUNNERSSEN ALLEN METALS

PTY. LTD.

88-92 YARRA BANK ROAD, SOUTH MELBOURNE

Phone: MX 4624 (9 lines)

Telegrams: "Metals," Melbourne.

# AMATEUR TELEVISION

## PART TWO

BY E. E. CORNELIUS,\* VK6EC/T

### THE VIDICON CAMERA TUBE

This camera uses a standard "Vidicon" type camera tube, available from most British and American makers of camera tubes. One British firm is releasing its substandard tubes through the British Amateur Television Club, at £25 stg., F.O.B. London. These substandard tubes have minor flaws, either a few spots on the photosurface or wall screen, causing small bright spots on the picture, or an overlong storage time, causing some "smear" on fast moving objects. Mine has five tiny spots, only visible when the lens is capped. As the new price of a perfect tube is of the order of £135 stg., the discount is considerable.

The tubes are easy to get going, sturdy and stable, have no "bugs" and give excellent resolution. Resolution to 5 Mc., and 400 lines or better, with sensitivity enough to give a reasonable picture under normal room lighting with an f.2 lens. Try a movie camera under these conditions! The pictures are perfect under good lighting, and one of my lenses is still much too fast at f.14 in sunlight.

For those interested, here is the method of obtaining one of these tubes.

#### 1. Join the club by writing to:—

British Amateur Television Club,  
L. A. F. Stockley, G3EKE,  
4 Norbury Court Road,  
London, SW16,

requesting membership, and sending 10/- stg. for a year's membership. This also entitles you to "CQTV," an invaluable little quarterly journal.

#### 2. Obtain an Import Licence Form A.I.L. from the Department of Customs and Excise. Fill in details:—

Category Item: 181 A1 B1.

Description: Television Camera Tube Vidicon Type.

Unit Price: £25 stg.

F.O.B. Value: £A31/7/6.

Freight and Insurance: £A6/12/6 approx. (airfreight).

Total C.I.F. & E.: £A38.

Write a covering letter explaining that you need the tube for bona fide t.v. research, that the tube is a manufacturer's reject, and forward to your Collector of Customs. You should have no trouble obtaining the licence, and Sterling released.

3. Write to the B.A.T.C. requesting supply of the Vidicon tube, and send a draft for £25 stg. only. Keep a carbon of your letter.

4. Wait about 4 to 6 weeks, tube will arrive, and a covering air letter from B.A.T.C., indicating the exact cost of freight, etc.

5. Take original of Licence A.I.L., your letter advising despatch from B.A.T.C., and carbon of your letter ordering the tube, to the Customs for clearance. As this is more or less a private transaction, and no trader's invoice is available, you will have to explain that the B.A.T.C. is a Club arranging, through the goodwill of the

manufacturer, to handle the British end of the deal. They require reasonable proof that the £25 stg. is the true value of the tube. Explain that the tube is not for resale, but for your own use in research, and is a reject unusable for commercial use, and no Sales Tax should be payable.

6. Collect tube from airfreight depot, beautifully packed.

7. NEVER allow the tube to be face (target) downward, as particles of cathode material, etc., may lodge on the wall screen or target, and cause spots on the picture.

The unit to be described consists of the camera proper and the viewfinder. They may be made up as separate units, with the viewfinder normally clamped to the top of the camera, but detachable if required. In a first design, the viewfinder may be omitted, but if the camera is used remotely, even a few feet away from the monitor screen, the viewfinder becomes necessary. See Fig. 5 for a block schematic.

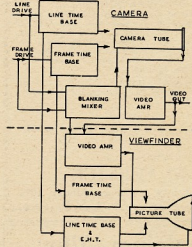


FIG. 5. CAMERA BLOCK SCHEMATIC

### CAMERA

This consists basically of three parts, line time base, frame time base, and video amplifier. Line drive and frame driving pulses from the sync. generator are used in the two time bases, and the pulse trains are combined to give camera blanking. This avoids having to send composite blanking up the camera cable, saving one coaxial cable, and as the driving signals are shorter in duration than standard blanking, the picture is slightly larger than that transmitted, which of course is "cropped" later with standard blanking.

Fig. 6 shows the complete circuit, camera section at the top, and viewfinder at the bottom. Four signal leads

interconnect the two, amplified line and frame driving pulses, at high impedance, composite blanking also at high impedance, and a sample of video from the camera at low impedance. If it is anticipated that the viewfinder should be used some feet from the camera, the high impedance feeds will not do, and cathode followers interposed.

### Time Bases

Two half 6SN7s, V1A and V3A act as driving pulse amplifiers, and feed high amplitude positive pulses to the two sawtooth discharge tubes, V1B and V3B. The amplified pulses also go to the viewfinder discharge tubes as outlined above. V2 is the line sawtooth current generator, feeding about 150 mA. to the vertical yoke, from the transformer. Width and linearity controls interact somewhat. A 25 ohm centre tapped potentiometer acts as a centring control, being fed about 200 mA. of centring current from the power supply.

V4, another 6V6, is the frame sawtooth current generator, with its output heavily damped, both at the transformer (300 ohms) and at the yoke with 2 x 750 ohms. Centring is similar to the line circuit, but as the circuit is of higher impedance, and virtually resistive, the capacitors around the centring potentiometer are not necessary. In each deflection coil feed a 10 ohm resistor used for c.r.o. measurement, both of amplitude, and for some indication of linearity. The current is 100 mA. for each volt of c.r.o. deflection.

### Focus Circuit

The camera tube focus coil has its focus current stabilised by a constant current pentode, which is shown at top right, and normally will be mounted in the camera control unit. Two alignment coils obtain current from this circuit, via centre tapped potentiometers, for beam alignment. Focus current will be about 40 mA.

### Tube Circuit

The tube itself requires various potentials, obtained from the networks shown. The target potential potentiometer is normally in the c.c.u., giving from +10 to +60 volts, the lower the better. Overall control of beam current should be from the c.c.u. also, and the -105 volt terminal shown in the grid network will go to another beam current potentiometer in the c.c.u. As shown, electrostatic focus control is in the camera, while magnetic focus is controlled from the c.c.u. They are more or less interchangeable, and the c.c.u. should have main control.

### Camera Tube Blanking

The camera tube must have blanking applied, or the retrace lines will show in all pictures. It requires 25 volts minimum positive blanking to the cathode, or 50 volts negative to grid. In this camera, the line and frame drive

\*157 Wood Street, Inglewood, Western Aus.





pulses are mixed in the 6L7, V5, and positive clipped pulses from its plate being fed via a cathode follower V6 to the camera tube cathode.

### Video Amplifier

This uses a cascode input stage, four amplifying stages, with cathode follower output, and a voltage regulator for the screens of the pentodes. The amplifier was designed to provide more than adequate bandwidth, controllable high peaking, the correct gain for normal lighting conditions, and a high value of target load to minimise noise and microphony. Other features are a feedback input stage for stability and h.f. compensation, and a feedback output stage for low impedance.

For feedback amplifiers, the component values are rigidly tied to the tube types, and the method of design may be of interest.

For a target current of 0.2  $\mu$ A. (peak white) across 0.5 megohms load, 0.1 volts is applied to the input stage. An output of 1.0 volt d/p. was required, so the minimum overall l.f. gain was therefore 20 db. Allowing 20 db. more for low light level operation, the designed external l.f. gain was 40 db.

For a bandwidth of 5 Mc. and 20 pF stray capacitance at target,  $X_{C_{stray}}$  at 5 Mc. = 1,600 ohms. As the target load is 500,000 ohms.

$$\text{H.f. loss} = 500,000/1,600 = 312 = 50 \text{ db.}$$

therefore internal gain must be 40 + 50 db. = 90 db., with 50 db. of high peaking. This was allocated as follows:

Stage	Circuit	H.f. Gain	L.f. Gain	High Peaking
1	Cascode 12AT7s with 100% feedback	23 db.	0 db.	23 db.
2	6AC7	20 db.	20 db.	0 db.
3	6AC7 high peaker	20 db.	-7 db.	27 db.
4	6AC7-6AC7-6J6 feedback pair	27 db.	27 db.	0 db.
		90 db.	40 db.	50 db.

The 12AT7s (V7, 8) with 2,200 ohm load, and by-passed cathode, have a gain of  $g_m R_a = 7 \times 10^{-3} \times 2,220 = 14 = 23 \text{ db.}$  Full feedback from the cathode of V9, gives an external gain of unity, and 23 db. of high peaking.

Stage 2 (V9) is orthodox, but with unity-passed resistor.

$$\text{Gain} = \frac{g_m R_a}{1 + g_m R_a} = \frac{9 \times 10^{-3} \times 2,200}{1 + 9 \times 10^{-3} \times 2,200} = 9.5 = 20 \text{ db.}$$

The third stage (V10, the 6AC7 high peaker) has an l.f. gain which is variable but is set to approximately 0.5, i.e. -7 db. H.f. gain is set by  $R_a = 1,500 \text{ ohms}$ , and  $X_{C_a} = 31.8 \text{ ohms}$  at 5 Mc. By the formula above, gain at 5 Mc. = 10.5 = 20 db., and thus 27 db. of high peaking.

The fourth stage is a feedback pair designed as follows: V13 is a 6J6 with  $E_a = 100 \text{ volts}$ ,  $I_a = 17 \text{ mA}$ , fixing the cathode load at 6,600 ohms, and  $E_c = 112 \text{ volts}$ . Therefore  $E_c$  will have to be 110 volts. This sets the plate voltage of V12, and as  $E_b = 260 \text{ volts}$ , and  $I_a = 10 \text{ mA}$ ,  $R_a = 15,000 \text{ ohms}$ . With  $R_a = 150 \text{ ohms}$ , by-passed only by 500 pF.

From the formula above, the gain of this stage is 52. V11 is a 6AC7 with 1,500 ohm anode load, and a gain of 10. Hence the total internal gain =

$52 \times 10 = 520$ . The external gain required is 27 db. = 22, and set by the feedback loop constants of 660 and 30 ohms.

The feedback  $B = 1/22$  and the feedback factor  $1 + BA = 1 + (520 \div 22) = 24$ . Therefore the output impedance of the 6J6 =

$$\frac{1}{g_m} \left( \frac{1}{1 + BA} \right) = \frac{90}{24} = 3.7 \text{ ohms.}$$

This is adequately low, and built out to 75 ohms by the 70 ohm resistor in series with the output line.

For zero tilt at 50 cycles, and coupling constants of 0.1  $\mu$ F. and 1 megohm, decoupling component values of 7,500 ohms and 8  $\mu$ F. are required. By using different coupling time constants between the stages within the feedback loop, stability is improved.

The circuit shows all values nearly as computed, and is extremely reliable and easy to get going. If you use different tube types, recompute on the lines above.

### VIEWFINDER

The sweep circuits are quite straightforward, embodying nothing new to normal receiver practice, with the exception that, as in the camera, there are driven time bases, not free running, and will close down on failure of the driving pulses. The constants in the output circuits may have to be modified to suit the transformers and yoke used, but the circuit is a good one, and gives good sweep linearity. Test

H.f. Gain	L.f. Gain	High Peaking
23 db.	0 db.	23 db.
20 db.	20 db.	0 db.
20 db.	-7 db.	27 db.
27 db.	27 db.	0 db.
90 db.	40 db.	50 db.

points are provided for waveform inspection as in the camera.

The video amplifier uses two stages to build up the 1.0 volts of video from the camera to the required 40 volts or thereabouts needed for picture tube modulation. Additional blanking is inserted in the suppressor of the first tube (V16) via a 6SH7 (V15).

### CAMERA DEFLECTION CIRCUITS

The camera tube requires special magnetic components, which are not difficult to make, although perhaps a bit tedious. The tube itself is shown in Fig. 7, all dimensions given being maximum. Some tubes have only the side exhaust tip, while others have both.

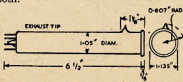


FIG. 7 VIDICON TUBE

Fig. 8 shows the assembly of the focus, deflection and alignment coils, with respect to the tube and each other. The front of the focus coil has a specially designed cheek, which is also the signal plate connector.

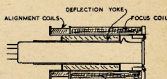


FIG. 8 YOKE & TUBE ASSEMBLY

### Deflection Yoke

This consists of a former carrying an electrostatic shield and the deflection coils, through which the tube is inserted. The dimensions of the former are shown in Fig. 9. The tube is 1-1/16" x 1-1/8" paper based bakelite. The cheeks are of 1/4" Paxolin or similar, and a snug sliding fit inside the focus coil tube. The rear cheek is drilled for tags as in Fig. 9, the tags consisting of 18 gauge tinned copper wire, a tight push fit in the holes.

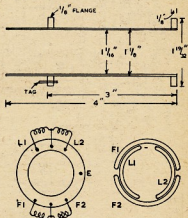


FIG. 9 YOKE ASSEMBLY

The electrostatic shield is a strip of 3 thou. shim brass, 1/4" wide, and about 3 feet long. It is anchored at the rear end, and terminated on the earth tag. It is then wound as a spiral up to the front of the tube, making sure that the edges of each turn do not touch. The front cheek is fitted next, with a circular shield of 10 thou. shim brass inside the cheek, and terminated to the end of the spiral. Scotch tape one layer over the spiral shim shield.

**The Coils.**—Make up the jigs as in Fig. 10, using 2" lengths of 1/16" Hiteit welding wire as the 12 pins for the frame coils. Use 16 gauge aluminium or brass for the coil cheeks.

### Frame Coils

Wind with a total of 620 turns each of 34 B. & S. double tough enamel wire, as follows: Insert four waxed threads in the slots (thin cotton) and



wind on 150 turns. Insert first row of pins, then 160, 150 and 160 turns on each set of pins in that order. Insert an additional 12 threads in the gaps between the pins at the corners, and tie all pins (16 in all), all knots being on the nut side of the jig.

Remove top plate (nut side), clearing the knots carefully after all pins and bolts have been taken out, and the core removed. On each side form the bulging wires to straight, and hold in place with a piece of Scotch tape in the centre of each side with the free end of the tape outside. Temporarily replace jig cheek over tapes, invert, and remove the other jig cheek. Carry the tapes around the coil on all four sides. Carefully cut all knots and remove thread, being careful not to cut the wire. During this process, the coil is very delicate to handle.

Make sure it is well shaped and flat, and dope lightly with shellac or similar. When nearly hard, form to an inside radius of 0.69" on a waxed wooden mandrel, bending the long side. Tie with thread till dry. The finished

sizes are shown in Fig. 10, but as long as the short side is under 2 1/4" it will go on the former.

#### Line Coils

These are wound with 165 turns each of 28 B. & S. double tough enamel. Place long waxed threads in the bottom of the slots, and wind on 26 turns. Tie at each corner, and wind on 26, tie 26 more, tie, and finally 27 turns, and the last tie.

These coils are quite solid when removed from the jig, and after doping, are bent on the 1 1/2" side, on a mandrel to a radius of 0.55".

**Fitting.**—The line coils are fitted to the former exactly opposite each other, and parallel to the axis. There will be a gap of some 3/16" between adjacent edges. Tape in position with Scotch tape, connect series aiding and terminate to the tags.

The frame coils are placed over the line coils, opposite each other, and at right angles to the line coils, see Fig. 9. They are best attached to a thin paper former, which is then slipped over the

line coils. This enables the frame coils to be rotated slightly to give a truly rectangular scan, and then cemented in position. Terminate to the tags as before. Fit a thin tube of paper over the coils, dope, and the yoke is complete.

Electrical Characteristics	Frame Coils	Line Coils
Ohms per coil	80	1.8
Inductance per coil, after shaping	17 mH.	0.6 mH.
Inductance — assembled — both coils	41 mH.	1.35 mH.
Resistance — both coils	159 ohms	3.9 ohms

#### Alignment Coils

These are far from critical and can be wound on a jig having a core 1 1/2" x 1 1/2" x 1/4" thick, with 500 turns each of 34 B. & S. enamelled wire. Outside dimensions are about 1 1/2" x 3/4", and curved to a radius of 1 1/2". Four coils are required, and mounted in the form of a small yoke, on the space provided on the focus coil assembly.

#### Focus Coil

The assembly of the former is very similar to that of the yoke, with paper bonded bakelite tube for the former, and cheeks of Paxolin or similar. Layer wind with 6,500 turns of 32 B. & S. enamel, over a 5 thou. tubular shim brass shield, with 10 thou. shim brass end pieces inside the end cheeks. Bring out an earth lead, and focus and alignment coil connections on tags in the back cheek, as for the yoke. See Fig. 11.

The front cheek is also the target connector, and is made of Paxolin or similar turned to the dimensions shown. Two steps are counterbored in the front, to accommodate the three phosphor bronze target connections. These are screwed in place and bent into the second step to support the tube, and to make connection to the target ring. The slot in the side is cut away to admit the camera tube side pip. This pip should lie in a horizontal plane. Outside dimensions of the end cheeks are not critical, and they may be square and screwed to a mounting base to allow the whole camera tube assembly to be rocked back and forth for optical focussing. This is normal practice.

The yoke should be a smooth sliding fit inside the focus assembly permitting rotation so that the scan can be rotated for correct orientation. The axis of the line coils will be approximately horizontal.

#### Tube Socket

This is a special—a small button ditalar 8-pin, and are unobtainable. You may prefer to dismantle an old socket and push the tags onto the tube pins, but a satisfactory socket is shown in Fig. 12.

A ring is turned from 1" diameter bakelite, 11/32" thick, and bored 1/2" in the centre for the exhaust pip. The dimensions shown are for tags taken from a Clix socket and may need to be modified for other makes. The punch is made from a part of a hacksaw blade and serves to punch out the last 1/32" of material for tag location.

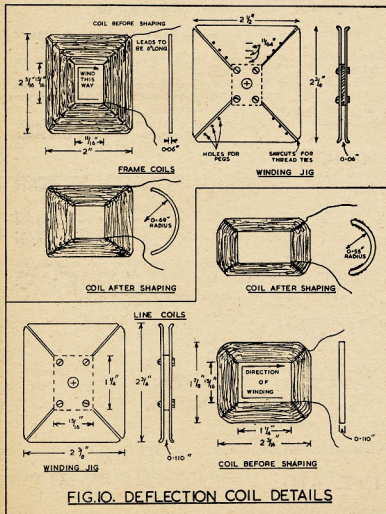
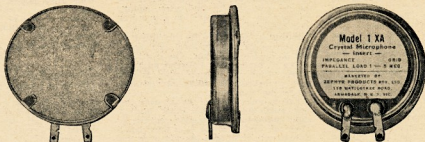


FIG. 10. DEFLECTION COIL DETAILS

# MODEL "1XA" CRYSTAL MICROPHONE INSERT



AUSTRALIAN MADE — — FOR AUSTRALIAN CONDITIONS



FITTED WITH PLATED REAR SHIELD TO ELIMINATE HUM PICK-UP

- Patented crystal unit guarantees outstanding efficiency and performance.
- Protected against ingress of moisture with approved moisture sealed crystal element.
- Small — compact — lightweight — durable.
- Will not blast from close speaking.
- Precision engineering ensures realistic reproduction and high output with long life and dependable operation.

- The only unit available with a genuine sintered metal filter.
- Good high frequency response ensures excellent speech reproduction.
- Aluminium diaphragm mechanically protected and frequency controlled by "Zephyril" filter.
- Australian made throughout.
- Only carefully selected cements used throughout, to suit Australian climatic conditions.

## TECHNICAL DETAILS

Rochelle salt crystal microphones are perhaps the most widely used for all types of service where quality speech and music reproduction at high output levels is a requirement. They are dependable in performance and when fitted with the appropriate "Zephyril" filter, their frequency response may be adjusted to suit any application or requirement.

This crystal microphone requires to be terminated with a high value parallel load of the order of 1 to 5 megohms for best results.

The mass of the moving parts is small, hence the sensitivity is high and a high efficiency is achieved.

Light gauge solder lugs are provided so that excessive heat in soldering will not be transmitted to the crystal element.

When mounted in a microphone cage, it is recommended that the insert be suspended in rubber, to eliminate shock and vibration.

One of the connecting lugs is directly connected to the case and care should be taken to solder the metal shield of the microphone cable to this solder lug, keeping the unscreened portion of the centre conductor as short as possible to eliminate hum pick-up.

All crystal elements are mounted on high grade suspension pillars, being fixed thereto with a good quality cement, thus ensuring stability and long life.

Case  $1\frac{1}{4}$ " diameter (rear),  $\frac{3}{8}$ " thickness, 1-13/16" overall diameter (front) with filter fitted.

Frequency Response = 60-6,500 c.p.s.  
Output Level = -45 db (0 db = 1 volt/dyne/cm<sup>2</sup>)  
Impedance = Model 1XA Grid 1 — 5 megohms.



Approximate Frequency Response Curve

AVAILABLE FROM ALL LEADING TRADE HOUSES

**ZEPHYR PRODUCTS PTY. LTD.**

58 HIGH STREET, GLEN IRIS, S.E.6, VIC.

Phone: BL 1300



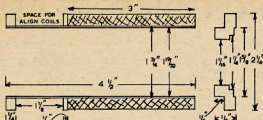
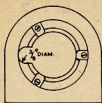


FIG. 11. FOCUS COIL ASSEMBLY

#### Transformers—Line

This is made using Ferroxcube, as follows:—

**Core:** Ferroxcube comprising—  
2 only D36/22 IIIB1 rings  
2 only D36/22 IIIB1 discs  
2 only D36/22 IIIB1 9.8 mm. slugs  
with 2 only NK587.41 end plates and screws, and 2 only 88481 coil formers.

Wind each former with: Primary—380 turns 34 B. & S. double tough enamel; Secondary—88 turns 28 B. & S. enamel. Connect series aiding.

#### Frame Transformer

**Core:** Ex speaker transformer with 1" x 7" stack, and 1 1/2" leg length. Primary—3,300 turns 37 B. & S. enamel. Secondary—1,100 turns 32 B. & S. enamel; butt joint core.

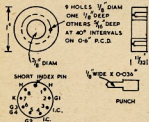


FIG. 12 SOCKET DETAILS

#### The Tube

I can do little better here than to summarise some of the maker's information, as it is not generally available.

#### General

Heater voltage ..... 6.3 volts  
Heater current (varies with maker) ..... 0.35 and 0.6 amps.  
Tight capacitance to all other electrodes ..... 5 pF. approx.  
Useful photosurface ..... 16 mm. diagonal  
Focussing method ..... magnetic (Routine adjustment of focus via G3, 4 potential.)  
Operating position—any except face downward, horizontal scan parallel to side pip, and radius through short index pin.

#### Ratings

	Maximum
Signal plate voltage	125 volts
G3, 4 voltage	350
G2 voltage	350
G1 voltage	—125 to +30
Peak H-K voltage—	
Heater positive	10 volts
Heater negative	125 volts
Faceplate temperature	40°C.

Typical	
Signal plate voltage	+10 to +60 volts
G3, 4 voltage	+200 to +300
G2 voltage	+300
G1 voltage for picture cut-off	—45 to —100
Signal output current (normal range)	0.1 to 0.2 μA.

For data on the operation of this tube, refer to "Television Engineering," Vol. 1, by Amos & Birkinshaw—brief but adequate.

#### Setting Up Procedure

1. Set G1 bias control for maximum negative bias to ensure beam cut-off, and apply focussing and deflecting power and the correct tube voltages as set out under typical operation above.

2. Set signal plate potential to +20 volts.

3. Focus an optical image on the photolayer and decrease G1 bias until a signal is produced and completely discharged by the beam. Failure to fully discharge the highlights will result in: (a) Clipping of the highlight signals, losing detail; (b) The remaining undischarged highlight signals will cause the affected areas of the target to rise toward signal plate potential. If the image is later moved, it will "smear" for several scans.

4. Alternately adjust optical focus and beam focus (G3 potential) for optimum resolution of the test image.

5. Adjust deflection amplitude and centre until the raster just does not show the edge of the target ring and the image is central.

6. If the image is weak, open the lens, or increase the target voltage.

7. Cap the lens and observe the shading signal produced by the dark current. If excessive, lower the target voltage. Note that loss of resolution will occur with a signal current lower than 0.2 μA.

8. Adjust alignment controls until the centre of the image does not move during beam focus adjustment. It will swirl around the centre, but the centre should not move.

#### Layout

No specific layout is recommended. Each to his own ideas. But plan to keep the tube toward the bottom of the camera in the coolest area. Allow for fitting a lens turret at some stage. The tube is designed for 16 mm. cine lenses, although one of mine is from a rifle sight. Keep the transformers away from the tube assembly, as it is susceptible to magnetic fields. Make sure the target end is well shielded

## SMALL SHIP IN DISTRESS

### VK7AJ Initiates Rescue

A Tasmanian Ham's alertness brought about the rescue of a luxury motor cruiser in distress off the New South Wales coast on Saturday, 18th January, 1958.

Atthol Johnson, VK7AJ, of South Hobart, was listening on the small ships' frequency at about 6.15 p.m. when he picked up a very faint distress signal. He was unable to receive the name of the vessel but heard that she was three miles from some Head.

He telephoned the Overseas Telecommunications Commission's coastal radio station at the Domain and a search with directive aeriels was begun, and the Navigation Department at Sydney notified.

Ships within 1,000 miles of the cruiser were alerted and a Navy crash boat from Jervis Bay was the first to her.

The freighter Watamura, on her way from Sydney to Hobart, turned back and towed the cruiser to Jervis Bay.

from stray electrostatic fields. Mount the video stage as close to the target as possible and shield the whole amplifier. Allow for camera tube racking-up to 7" for long focus lenses.

#### Camera Cable

When the camera is working on test, a short cable about 12 feet long will serve, but you will soon want to take it outdoors and a long cable is essential. I use two, one 12 ft. and the other 30 ft., but there is never enough.

As soon as the camera goes out on a long cable, you will see the need for another pair of hands and this is where the club or community comes in again. One cannot operate camera, camera control and the transmitter under these conditions and a team of at least two is desirable.

The 5F7P viewfinder tube has a double cascade phosphor, with short persistence blue nearest the gun, and long persistence yellow near the glass. This last means serious smear on moving objects and may be overcome by means of a light filter. Using very thin wrapping cellophane, of a very dark blue, about the colour of the blue on the newer A.W.V. tube carton, cut a piece about 1" greater in diameter than the tube face. Clean and then wet the whole tube face and dip the cellophane briefly in water. Apply to the tube as you would a transfer, smoothing out all bubbles. Remove the excess water squeezed out and carry the extra width around the end of the tube. Fasten off with scotch tape, making sure that some of the tape width is in contact with the glass. This is permanent if well done and the resulting smear is negligible. More than half the brilliance is lost, hence the use of 8 kv. on a tube designed for 5.5 kv. With the filter a good bright picture results, and no viewfinder hood is needed indoors.

In Part Three I will describe the camera control, which relieves the cameraman of the need for four arms.

# 1957 VK-ZL DX CONTEST RESULTS

## AUSTRALIA

C.W.—					
Call	Total	40	20	15	10
VK2GW	3920	355	2280	660	625
2BA	2605	1975	630		
2AIR*	2350	2350			
2JX	1580				
2ARD	1430	1160	270	565	
2VN	950		950		
2HZ	895		895		
VK3DQ	3125†	150	1440	1010	475
3AHQ	2615	1250	1070	295	
3YD	770	770			
3RJ	680		135	545	
3XB	680		680		
VK4NL	1350		1350		
4DO	1135		1135		
VK5KU	1920		1920		
5MY	1780		575	1205	
5WO	1650		825	715	110
5RX	740		740		
VK6RU	4375	100	1625	1770	880
VK7UW	2780		1140	1640	
7KM	2485	280	1045	810	350
7LZ	1055	25	360	460	210
7NC	750		750		
VK9XK	4045	145	1460	1345	1095

\* Also 15 Metre Check Log.  
† Includes 50 points on 80 Metres.

## PHONE—

Call	Total	40	20	15	10
VK2AOU	1860	380	945	535	
2VV	1370		240	1130	
2AKV	835		25	395	415
2AKF	615		50	395	170
2JX Check Log.					
VK3HL	825		275	550	
3LW	150		125	25	
3AJP	140		140		
VK4TN	2325		605	975	745
4CB	1005				1005
VK5WP	1410		405	385	620
5LC	1095				1095
5WO	1055		525	310	220
5LG	80			80	
VK6RU	2790	25	915	1465	385
VK7LZ	1035		290	670	75
7WA	720		75	645	
7NC	345		25	320	
VK9BW	305			110	195

## RECEIVING SECTION—

	Phone	C.W.*
VK2—D. Grantley	230*	1295*
VK3—E. W. Trebilcock		525*
VK4—C. H. Thorpe	1525*	
VK6—F. H. Price	1015*	
VK7—R. de Balfour	970*	
VK9—R. Clark		950*
P. Reid	225*	475
G. R. Morris—Log incorrectly set out.		

\* Award winners.

## AWARDS (Call Areas)—

C.W.—	Points
VK2GW—W. L. Woolnough	3920
VK3DQ—C. S. Donoghue	3125
VK4NL—N. H. Lawton	1350
VK5KU—E. J. Von Stanke	1920
VK6RU—J. E. Rumble	4375
VK7UW—S. H. Pattison	2780
VK9XK—S. R. Coleston	4045

Phone—	Points
VK2AOU—H. F. Ruckert	1860
VK3HL—A. T. Hutchings	825
VK4TN—A. Harris	2325
VK5WP—A. H. Watts	1410
VK6RU—J. E. Rumble	2790
VK7LZ—C. F. Wright	1035
VK9BW—W. H. Holland	305

## AWARDS (Band)—

C.W.—	Points
Metres	
80 VK3DQ—C. S. Donoghue	50
40 VK3YD—R. W. M. Ross	770
20 VK2AIR—A. J. Smith	2350
15 VK6RU—J. E. Rumble	1770
10 VK9XK—S. R. Coleston	1095

## PHONE—

Metres	Points
40 VK6RU—J. E. Rumble	25
20 VK6RU—J. E. Rumble	915
15 VK6RU—J. E. Rumble	1465
10 VK5LC—L. E. Catford	1095

## NEW ZEALAND

C.W.—	Total	40	20	15	10
ZLIAH	2165	2020	685		
1APM	2350		2350		
1AMM	1985		845	680	460
1MT	1610*	50	735	480	315
ZL2GS	3570		1495	1605	470
2ARL	1965	135	490	845	495
2AI	1790		1790		
ZL4GA	4085	175	3000	910	
4CK	2015		1820	195	
4MK	1080			550	530

\* Includes 30 points on 11 Metres.

## PHONE—

Call	Total	40	20	15	10
ZL2ATZ	325		325		

## AWARDS (Call Areas)—

C.W.—	Points
ZLIAH—J. D. Wightman	4870
ZL2GS—H. E. H. Green	3570
ZL4GA—A. F. Frame	4085

## PHONE—

Call	Points
ZL2ATZ—P. W. Hitchcock	325

## AWARDS (Band)—

C.W.—	Points
Metres	
40 ZL4GA—A. F. Frame	175
20 ZL4GA—A. F. Frame	3000
15 ZLIAH—C. M. Rowe	2350
11 ZLIMT—W. A. W. Stevens	30
10 ZLIAH—J. D. Wightman	685

## PHONE—

Metres	Points
20 ZL2ATZ—P. W. Hitchcock	325

## RECEIVING SECTION—

Phone	Points
ZL14B—B. Thomson*	2445
ZL302—J. B. Holder	1470

\* Award winner.

## OVERSEAS

\* Award winners.  
† Check Log.

C.W.—	North America	Pts.
W1BIH*	1475	685
W1JYW	1255	640
W1NLM	505	2010
W1PWK	170	1715
W2EQS*	1470	1360
W2BYN	720	655
W2AWH		685
W2SZ		640
W3VKD*		2010
W3ZAO		1715
W4LZE*		1360
W4DS		655

North America (continued)			
W4WSF	165	W8UVZ	910
W4HKJ†	165	W8OCA	635
W5VHR*	2295	W8JXY	545
W5LGG	1700	W8TTN	530
W5QF	1510	W8KMF	285
K5GRT	280	W8FIT	225
W6TT*	2680	W8WNK	220
W6YMH	1845	W8CKK*	640
W6ID	1260	K9ALP	480
W6ZMX	1130	W9JNO	455
W6ATO	920	W0RSL*	1850
W6UED	850	W0BMM/0	1560
W6YC	715	K0BSL	795
W6KNM	680	W0JMB	615
K6SXA	630	KL7BPK*	515
K6DDO	345	V5EHB*	490
K6LZI	345	V5EDDR	295
W6CLZ	235	VEIEK	110
W7PQ*	2245	V5EEG	55
W8BHW*	2595	XE1PJ*	460
W8JIN	1475	XE1CM	220

## South America

LUTAS*	620	PY7AN	520
CE3AG*	1200	P3QX	465
YV5DE*	520	PY4AO	275
PY1ADA*	990	P24AE*	115

## Europe

DL1KB*	1750	O6ERF*	615
DJ1BZ	1650	OELHV	350
DL7AA	1525	O2ESH	280
DL9RK	1185	OH4NT*	985
DJ3JZ	1040	OH2HG	675
DL7DF	1030	OH1TQ	660
CH1JZ	740	OH1JZ	445
DL3ED	560	OH5RO	385
DJ2KU	520	OH6PK	285
DL2BW	470	OH2GS	120
DL1ES	225	OKINC*	940
DL1YA	225	OK2KBE	745
DL9BG	169	OK2KLI	465
DJ3GE	110	OK1MP	220
EA3KT*	345	ON4PA*	1210
E19F*	300	ON4CK	740
E19D*	110	ON4LX	555
F9DW*	285	OZ3FL*	1020
F8DF	110	OZ1W	325
F9BB	55	OZ4FF	400
G5RI*	1380	PA0TAU*	870
G3FKB	1355	PA0VB	860
G2DC	1205	PA0VO	845
G6XL	1195	PA0VL	505
G5HZ	1055	PA0BV	480
G6CJ	810	PA0CF	165
G2AOL	290	PA0HP	55
GW3AHN*	895	SM3AKW*	1840
GBJX5*	335	SM7MS	680
HA5BI*	860	SM5KV	110
HB9MO*	800	SM5CC*	325
HB9TT	755	SM6BDS†	
LA2Q*	620	SP3PL*	1510
LA6CF	170	SP8CK	470
LZ1KRF*	170	SP6XA	55

## U.S.S.R.

UA3KBA*	690	UB5KAB*	745
---------	-----	---------	-----

## Asia

JA1VX*	1910	JA2WB	400
KA2MP	825	JA0GG	165
JA6TA	500		

## Africa

CN8FD*	280	ZS5U*	400
FA3OA*	300		

## Oceania

KH6CMM*	230	ZS5AL*	855
---------	-----	--------	-----

(Continued on Page 12)



→ **You will See the Difference**



*Servicemen, technicians and salesmen alike will see the difference the Radiotron Valve Manual makes to their valve characteristic problems.*

For the first time under one cover the Amalgamated Wireless Valve Company presents the following complete and comprehensive technical data:—

Receiving Valve Classification Charts • Base Charts • Valve Data • Picture Tube Data  
Photocell Data • Semi-conductor Diode Data  
Transistor Data.

This information is tabulated in numerical and alphabetical order, and lists, for each type, principal functions heater voltage, typical operation and base connections.

Covered in heavy art board for durability and priced at 3/- including postage, the Radiotron Valve Manual (RVM-2) is available on request from A.W.V.

*Published by*

**AMALGAMATED WIRELESS VALVE CO. PTY. LTD.**  
47 YORK STREET, SYDNEY



# PHONE—

North America			
	Pts.		Pts.
W2BVN*	445	K6DDO*	1100
W3VKD*	1000	W6ZMX*	565
W4KYI*	820	W0GEK*	425
W4HEJ*	625	VE7AIH*	1530
K5JLY*	500	VE3HB*	395
K5EDM	355	CO2HB*	540
W5PNG	55		

South America			
CX3BH*	635	PY? L. J. Braga*	
PYIAKT	165		395

Europe			
CT1PK*	310	OH2OV*	1290
DL1KB*	1595	OH5PE*	1050
DL1FK*	935	OH5NM*	680
DL1UX*	895	OZ3FL*	755
DJ1EZ*	670	PA0FX*	620
F8RM*	385	PI1J*	470
F8HR*	230	PA0OTC*	285
F3JI*	55	SM3BIZ*	370
G5HZ*	675	SM5TR*	250
GW3AHN*	405	SP8CK*	290
IIAMU*	900		

Africa			
CT3AN*	170	ZS5OA*	625
VE3AHU/SU*	390	ZS5RB	565

Asia			
JA1AS*	580	VU2RC*	230

# RECEIVING—

	Pts.
Austria—OE1-710 W. Flor*	640
Czech—OK2-3947 Z. Novak*	520
OK1-001307 W. Schon*	405
England—BR520317 W. E. Wilkinson*	1695

R. F. W. Thomas	1360
BR520206 A. R. Smith	1270
BR56604 E. H. Sherlock	940
BR521246 N. S. Beckett	870
Japan—JA1-1362 K. Tsukahara*	1225
JA3-1363 K. Asano	1045
Switzerland—HE9RDX E. Heritier*	515
Nth. America—R. Fagen*	660

Phone—	Pts.
Austria—OE9CZ C. Zangerl*	400
OE1-710 W. Flor	275
Belgium—ONL610 Miss A. R. Delvaux*	685
Czech—OK1-007820 Z. Prosek*	235
England—R. F. W. Thomas*	910
Germany—F. W. Kradepohl*	525
Netherlands—NL864 H. Frieke*	110
Sweden—SM5-2735 K. Nystrom*	610
Switzerland—HE9ERU H. Zimmermann*	165
HE9ERY R. Ochsner*	165
Nth. America—ISWL/K2-7079 B. Adams*	450

# HINTS AND KINKS

## USEFUL OCTAL PLUG

A useful octal plug can be salvaged from burnt out metal type tubes. Remove the metal shell, then the electrode assembly. Drill and file an  $\frac{1}{8}$ " hole in the top of the metal shell and insert a  $\frac{1}{8}$ " x  $\frac{1}{8}$ " grommet. The result is a neat, inexpensive and durable plug.

# W.I.C.E.N. NOTES

The report brought back to Headquarters covering the activities in VK2 is most pleasing. The new Council is to be congratulated on its plans to extend even further the facilities at Dural. In the establishment of which the retiring Council and particularly Jim Corbin, VK2YC, laboured so hard and with such good results. Our thanks go to Jim and colleagues who wrought the miracle. We are sure events of the future will justify its existence.

Recent reports from VK4 and VK1 indicate that progress is being made in improving the status of Amateur activity in those States.

## OPERATING PROCEDURE (Continued)

2.25 Each message shall be identified by its transmitted time.

2.26 The message shall consist of six parts: (1) Originator's Call, (2) Mailing, (3) The Address, (4) The Text, (5) The Signature, and (6) the Transmitted Time.

2.27 Address. Where it is possible to make prior arrangements for the predetermined distribution by the Control Station, such distribution should be made in accordance with transmitted code address.

2.28 Acceptance of a single message intended for two or more addressees shall be permitted.

2.29 The priority accorded each message will be based upon 3.0 and the appropriate symbols shall be transmitted in the preamble.

2.30 Text. The text of messages shall be as short as practicable to convey the necessary intelligence.

2.31 Signature. Self explanatory.

2.32 Transmitted Time. The transmitted time is the time at which the operator reaches the time group in the message form.

2.33 Communications shall commence with a call and a reply when it is desired to establish contact except that, when it is certain that the station called will receive the call, the calling station may transmit the message without waiting for a reply from the called station.

2.34 After contact has been established, continuous two-way communication shall be permitted without further identification or call (if no mistake in identity is likely to occur) until termination of the contact, provided call signs are announced once in every five minutes.

2.35 When no confusion is likely to arise, a shortened form of procedure shall be permitted. For example, "Standby", "Over", "Is", "Roger", and other phrases may be omitted at the discretion of the operators after initial contact has been made.

2.36 An acknowledgment of receipt shall not be given until receiving operator is certain that the transmitted information has been received correctly.

2.37 When sending or receiving a message it will, when possible, be written on the official W.I.A. message form. Under all circumstances message should be laid out in the same style.

2.38 Alternatively it may be necessary to use the message form provided by State Civil Defence Service.

2.39 When an error has been made in the transmission, the word "Correction" shall be spoken, the last correct group or phrase repeated, and then the correct version transmitted.

2.40 Items shall not be repeated, unless repetition is requested by the receiving station.

2.41 The receiving station shall always request a repetition if reception is doubtful.

2.42 If repetition of an entire message is required, the words "Say Again" shall be spoken.

2.43 If repetition of a portion is required the operator shall state: "Say again before..." (first word satisfactorily received), or "Say again..." (word before missing portion) "to..." (word after missing portion), or "Say again all after..." (last word correctly received).

## 3.0 PRIORITY—

1. Messages relating to public safety and rescue work.
2. Requests for medical aid and essential supplies.
3. Requests for additional communication services.
4. Messages relating to location and requirements of rescue teams.
5. Telegrams in order of priority authorised by local Postmaster.

Note.—All messages must be initiated by person to whom authority has been delegated.

# NATIONAL FIELD DAY RESULTS

## AWARDS

C.w.—VK7CH, C. Harrison.  
Phone—VK3ZCG, W. G. Francis.  
Open—VK3LC, L. E. Catford.  
Multiple—VK3LC/3AHD, A. W. H. Chandler/A. H. Downward.  
Fixed—Nil entry.  
Receiving—J. M. Hilliard.

## LOGS

C.w.—VK7CH 48.  
Phone—VK2AUJ 43, VK3ZCG 117, VK3AUC 52, VK3ADL 33.  
Open—VK3LC 179, VK7LJ 50.  
Multiple—VK3LC/3AHD 137, VK5MK/5QR 93, VK5EC/5AV/5KL, Check Log.  
Fixed—VK5JO, Check Log; VK3PR, Check Log.  
Receiving—J. M. Hilliard 23.

# Low Drift Crystals FOR AMATEUR BANDS

ACCURACY 0.02% OF STATED FREQUENCY

3.5 Mc. and 7 Mc.

Unmounted ..... £2 10 0

Mounted ..... £3 0 0

12.5 and 14 Mc. Fundamental Crystals, "Low Drift," Mounted only, £5.

THESE PRICES DO NOT INCLUDE SALES TAX.

Spot Frequency Crystals Prices on Application.

Regrinds ..... £1 10/10

**MAXWELL HOWDEN**  
15 CLAREMONT CRES.,  
CANTERBURY, E7,  
VICTORIA

Page 13





the real DX is running, to the detriment of others on near channels. Not very sporting, most 6 mx work does not require that and in any case, it is not good operating practice to try and modulate beyond the capability of the final.

A word on using some more of the band than the first meg. There are a few hardy souls on 31 and a VK4 on 51-12 Mc. or was it 51.27, forget which at time of writing, but tune up there sometimes, or get a rock and go up also for we must use the four megs if we want to hold them and in any case it's less noisy there and certainly clearer of QRM of all kinds. It is really worth serious thought and action for those reasons, so give it a go.

Back to the JA break-through. On 2nd Feb. 5MT, 5MK, 5RO, 5QR, 5EF, 5ZAW were all heard working the JA2 on 6 mx with some fairly decent sig reports being given too. Then again on the 12th, a further batch were worked with the band being workable at time varying between 1200 to 1330 hrs. C.S.T. daily right up to the 23rd. A real "field" month for those who could be at it. Keith 5MT had his holidays during that period, so was in it daily.

On the 22nd, which seemed to be the peak here, there were JA1, JA7 and JA8 stations being heard at 40 over 9 (not at my QTH unfortunately), so those who missed out on the earlier days caught up then and from "over the air" information all the 6 mx gang have made contact with at least some of the districts, and a few with the lot. Col 5RO and Keith 5MT seem to have the highest scores.

Ron 5MK advised that on 23rd he was hearing VK2, VK3, VK4 and a solitary JA up to midday, then by 1225 another break-through occurred with JA1 and JA3 topping the poll for strength. In the midst of all this, a lone DU was heard calling Reg 5QR on c.w., which he may have worked, but didn't hear him do it from here.

It is interesting to note that the JA boys themselves have worked the following areas this year: W, VE, VK, ZL, KW, KH, LU and KLI, and according to the latest advice here, ZL2DS from the 21th onwards has worked V and KH8 as well as VK and JA.

4XJ has some information about Test transmissions from WTEYD, KHRUL and KHRUK, but as the figures, etc., here on them don't tie up, suggest all interested contact him for details or look carefully through VK4 v.h.f. notes where it should be reported.

Sorry if we have missed 2 and 1 mx this month, but due to above, most of the listening has been done on 6 mx, so cannot report on those other bands this month.—3EF.

#### WESTERN AUSTRALIA

The 144 Mc. Fox Hunt on 8th Feb. was conducted by Don 6ZAV and Roy, about 7 or 8 cars got away to a flying start right on time. Frank 6CC was in first, using an etal divider instead of the super-regen., followed by Don 6HK and Stan 6ZAS. The tx was hidden about 50 yds. or so from where the gang started in King's Park. Supper followed at 6ZAV's QTH, winding up another good evening's entertainment.

On Saturday afternoon, 15th Feb., members of the V.h.f. Group were shown over D.C.A. Radio Installations at Guildford Airport. The D.M.E. and marker set-up were of great interest to all and our thanks go to Ralph 6ZAO for the work put in to organise the visit and in particular the explanations of the various installations.

The V.h.f. Group meeting took place on Monday night, 24th Feb., at D.C.A. Workshops as usual. After the business side was dispensed with, a junk sale was conducted to raise funds for the Group—very successful. Dennis 6AW brought along a recording on tape and, possibly, gave the majority of members their first impressions of the American satellite transmitting on 108 Mc. Thanks Dennis, we know you have put a lot of time into gear, etc., for this occasion.

Don 6ZAK and Len 6ZAT, after much study during the last twelve months, obtained their leaving certificates, which gained for them positions as Cadet Engineers with D.C.A., and also four years at Melbourne University in Electronics. They take with them the best wishes of all Group members, and by the time this appears in print, should be well and truly settled in.—6ZAV.

#### TASMANIA

50 Mc. hasn't been the best for sporadic-E QSOs, but this has been made up for by other unusual openings. TAB became the first VK7 to work a JA station in January, actual details not to hand, but was around midday. 7LZ and 7BQ worked into VK3 for some short hop QSOs. The outstanding feature was the aurora openings between VK3, VK2, VK7, VK3 on 11th Feb.

7LZ is not in a favourable position for visual sighting of aurora, but had been reading an article and saw a bright flare in the west, so turned beam south around 2100 to hear a garbled modulated signal which sounded like 7AB. Col answered on c.w. and a contact was made, what is believed to be the first VK 50 Mc. auroral QSO. 3ALZ came up on the frequency to work 7LZ. Col then worked 3AHL, 3AHL and heard a VK3, but no contact, but 7AB worked him. 7BQ came on to work 3ALZ and found at that time with his beam west gave the best signal with less noise. As signals decreased, 7LZ again worked 7AB on phone to round off the evening.

144 Mc.—A sharp decline in activity resulted at the end of the Ross Hall Contest. On the VK3 Field Day, 3ZCG was putting an S9 signal into Launceston, from a portable location, and worked 7LZ and 7PF. It wasn't until 24th Feb. that conditions improved. 7LZ worked 3ZDD, 3ZD, 3VL and 3ZCG. Col heard a carrier for two hours before he identified and made contact with QSO to make his first 2 mx VK5 QSO. 7BQ was on but was unable to make it.

7BQ now has a 10 element long yagi which is about two S points better than the older beams. 7PF may soon be operating from Devonport and hopes the location is good for v.h.f.—7PF.

## UNIFORMS DUST COATS

for your Office Staff, Factory,  
Workshop, Servicemen.

★  
Bowls Frocks, Tennis Frocks,  
for the retail trade.

★  
**D. MILBURN & CO.**  
238 Flinders Lane, Melbourne



## CRYSTAL STICK MICROPHONE (Type Mic 39)

A new and beautifully styled microphone for use as a hand, desk or floor unit.

A special liner in the case eliminates hand-capacity effects. Special screening gives greatly increased signal to noise ratio and FEED BACK IS REDUCED TO A MINIMUM. Designed especially for high-quality recording, public address, dance bands and broadcasting work.

- Frequency response flat 50 c.p.s. to 10 K.c.s.
- Omni-directional.
- Overall length, 4½ inches.
- Maximum diameter, 1½ inches.
- Minimum diameter, ¾ inch.
- Supplied with 8 ft. special noise-free screened cable.

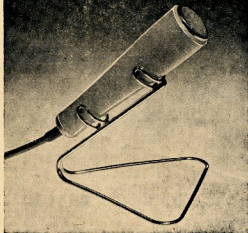


Illustration shows microphone on desk stand

**PRICE, £8/19/6**

Available from leading radio houses

TECHNICAL LEAFLET  
POSTED FREE  
ON REQUEST

**AMPLION (A/sia) PTY. LTD.**

101 PYRMONT BRIDGE ROAD,  
CAMPERDOWN, SYDNEY, N.S.W.

**Jan J. Hunt, W1A-L3007**  
211 St. George Road,  
Northcote, N.16, Vic.

How about giving a fellow a go and dropping a line telling him of YOUR dots and thus give me something to write about. If some of you don't provide me with something as a basis for these notes, I can assure you I will be long before there will be no s.w.l. notes at all included in the magazine.

**S.W.L. Groups.**—During the past several months I have noted comments indicating that there has been a little interest in the organisation of S.W.L. Groups in other States besides VK3, VK5, VK6 and VK9. However, apparently nothing much has come of it. I have not received any news from VK5 or VK9 for quite some time so how about those Groups coming to light with some news. I also feel that most of our readers would be very interested in hearing how the plans of other States are progressing with regard to Groups. Can't somebody write and tell us please?

I have received a letter from Eric Hardwick, of 28 Streatley Road, Rivervale, Perth, Western Australia, who has just formed a Group, known as the "Short Wave Group of W.A." has been formed. This Group, which consists of initially 11 members, is, I believe, seeking affiliation with the Western Australian Division of the Institute, and we all hope that they will be successful in their efforts along these lines. The Group has appointed a President and Secretary, namely Eric as President and his XYL, Rose, as Secretary, for the time being. There is no doubt that they will be able to keep each other up to the mark and thus provide plenty of action within the ranks of the Group and office-bearers. We wish this Group every success in their activities. Any of you W.A. s.w.l.s. who are interested in this Group might contact Eric at the above address.

**Group News.**—The only Group news this month comes from the VK3 Division. At the February meeting, there were 12 members present including a new member, Ted Wickett of Niddrie, which to the uninformed is the same place as the Niddrie in the States. I met you, Ted, and we hope you will continue to honour us with your presence. Amongst the members present was also the new member, John Campbell of the VK5 Division Group and also Angelo Harris who we haven't seen for some time.

It was also reported that the Group President, Len Poynter, and Secretary have at last begun the A.O.C.F. course. It looks like at the next election of office-bearers there will be vacancies in these positions. Let's hope the exams are not too stiff anyway. After a discussion of contests to be run by the Group, the meeting closed and members began their usual after-meeting ear-bash session.

**Contests.**—As a result of the February meeting, the Group has decided to run the following Contests.

(1) Card of the Month Contest. To enter this contest, it will be necessary for you to forward to the organising Secretary of the Group any QSL card or cards you have received during the past month. The cards will be judged by the organising committee and the best card for the month chosen. The appearance of the card, location of the station forwarding the card, any other features considered by the committee to be unusual or of special interest will all be considered. The winner of this contest will be asked to receive any special award, but his name and any other interesting details about him will be included in the notes each month.

(2) DX Ladder. This contest will also run continuously. To enter you must forward to the organising Secretary of the Group any QSL received from any overseas stations during the post-war period. The contest will be divided into two sections, namely, Amateur, and Short Wave Broadcast, to cover QSLs received from S.W. Broadcast Stations. Each QSL received will be given one point. No award will be issued for this contest, but a list will be published in these notes at the time of the closing of each contest on the ladder in a similar manner to the DXCC list for transmitting Amateur. If I have any news from the Tellico, BERS195, W1A-L3042, decides to enter?

(3) Marathon Contest. This contest will run for a period of a year, on 1st April and continuing till 31st March, '59. It includes reception of broadcast, short wave broadcast, and Amateur stations. Keep your QSLs cards carefully until the year is ended and after that time submit them to the Group organising committee for judging. The contest is open to all s.w.l.s. throughout Australia, although a nominal fee of 2/6 will be charged to any entrant who is not a member of the Wireless Institute of Australia or an affiliated club.

A multiplier in the form of the number of QSLs submitted multiplied by the number of countries represented by the QSLs will be applied to all cards confirming reception of stations below the frequency occupied by the 100 Mc. band. The reception of stations above this frequency the same rule will apply with the addition of a multiplier of two for reception of stations at a distance of 10 miles and up to 100 miles, a multiplier of three for such stations from 100 to 1,000 miles distant and a multiplier of four for stations received from a distance of over 1,000 miles. So you can see that no matter what type of listening you do you can still enter and win. However, you must remember that if you are forwarding QSLs through the post you must include return postage on the cards. That applies to all of these three contests.

**Visit to VK9OM.**—On Wednesday evening, 12th March, seven members of the Group journeyed to Glen Waverley to visit JOM, owned and operated by Ron Fisher. The evening was spent by the boys and the girls at a delicious meal. Ron and his good wife, Lynnette, spared no effort to ensure that everyone had a good time. George JACQ, who brought along his double conversion BC348 which was set up together with an AR8 in a room adjoining the shack. He kept the boys busy tuning around the shack while each member took his turn at conducting a QSO from JOM.

Ron's home-built 80 through 10 m x tx, which is a masterpiece of engineering, was put of 6140s in the final, is truly a masterpiece of craftsmanship. His 8X42 rx is a delight to handle.

After working many stations, a lavish supper was served and Lynnette must have worked very hard to prepare all the good things. It was most enjoyable. We would like to express our sincere thanks to Ron and Lynnette for arranging such a wonderful evening and to George for coming along and showing his interest in the Group.

The Group intends to hold more visits of this kind in the future. The only member who interested came along to our meetings and find out all about it. We meet at the Institute Rooms, 10 Queen Victoria, Melbourne, on the last Tuesday of each month at 8 p.m.

**Phyl Moncur**  
235 Union Road,  
Ascot Vale, Vic.

**"Squawker."** of New South Wales, has forwarded the following:

Since last writing in this column, I have been a busy bee by the only beehive I possess, my knowledge of Radio Hams and OM's as deplorable. Following a little elementary instruction, I was known. Radio man was thrust at me with instructions to (a) Read it from cover to cover, (b) See if the diagrams therein didn't mean something to me. (Anything said, well, better than nothing at all.)

This approach, I felt, was a little sudden and a bit harsh, too, but, being a dutiful XYL, I complied with wishes. The OM, I must say, while, embraced his moth-eaten relic and prepared to tune in to the "boys".

"Chassis for Little James!" I read as I turned a page, according to plan. What a chassis! All I could think was that Little James was some boy with all that wires in his chassis. Iaving not set eyes on one of these before, I felt quite lost, therefore ventured to ask the OM a few questions. "This chassis certainly looks interesting," began. "The OM was delighted at my interest. Oh, you mean the sockets for the valves? He chuckled. "I don't know, whoever heard of a chassis with valves sticking out of it?" I asked. "Not only that, but the chassis is a square, you know."

The OM seemed a bit puzzled. "Well, it's not exactly square, you know," he said, "It's

## CORRESPONDENCE

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

### S.S.B.

Editor "A.R." Dear Sir,

Referring to "A.R." Feb. '58, the article "Mathematical Considerations of S.s.b." in the conclusion the author uses the phrase "ask yourself honestly have you ever heard an s.s.b. signal that really sounded like a.m.?"

This seems to be an ever-recurring phrase, which and others of the s.s.b. fraternity fail to understand.

What does a.m. sound like for the purposes of this comparison? Is it the a.m. signal with the 50 cycle f.m. component, the a.m. signal with speech f.m. or possibly the signal with up to 20 db. of speech clipping, or even the hi-fi addit with 20 Kc. bandwidth? Is it the signal with 10% or 110% modulation? Is it the signal whose frequency sweeps 10 Kc. in 10 minutes or the one that jumps 1 or 2 Kc. every so often?

May I suggest that anybody in this day and age who still believes that s.s.b. does not sound like a.m. (an odious comparison) should visit some of his friends or acquaintances who have a receiver selective and stable enough to receive s.s.b. properly, and have a good listen to s.s.b., including the good bad and indifferent signals, all of which vary in quality according to the resource and technical or operating ability of the individuals concerned.

Then may I further suggest that on the same receiver they listen to a.m. signals on "Exalted Carrier Reception."

But afterwards please don't say "a.m. does not sound as good as s.s.b."

I bet 35 years ago somebody said, "You know this new fangled c.w. isn't so good to copy as the good old spark."

C. B. Edmonds, VK3AAE.

### OBLIQUE STROKE F.O.C.

Two further letters from Mr. W. H. Windle (G8VJ), Chairman F.O.C., and Mr. Roth Jones (VK3BG) have been received. It is considered this matter has been covered and no useful purpose can be served by publication of further correspondence. The subject is now closed.—Editor.

more of a rectangle." This floored me. "What!" I exclaimed, "Why that's worse. How would you like your chassis to be rectangular with the valves in a line, say?" The OM took a fit. That's the only way to describe the peculiar motions he went through in the next few seconds. Coupled with mutterings of "Oh, no, oh no." The area was quite alarming. One good thing came out of it though. I don't have to read the book any more.

This radio craze pervades your whole life once it catches your man. Take my last afternoon, I was listening to some confidential tones to Mrs. Black, a very proper lady, about the noisy neighbors next door, who she says ought to be banned from the world altogether. I am rudely interrupted. "VK such and such, here, Mac," bellows a lusty male voice as the OM takes over. Mrs. Black says, "I see all over my best cloth as the OM shifts back. Then, in a quiet whisper, he takes the next instalment from the OM's session, as one of the "boys" gives some idea certain information in some foreign language, which the OM seems to understand.

One minute I am shouting above the din, the next, I am whispering. At times I find my shouts coinciding with their whispers. No wonder the noisy neighbors are so annoying to readers. I have just bought the OM some fishing gear.





The most remarkable thing of all, however, is that all the stations operated are remotely controlled due to the inaccessibility of most locations. Apparently the only thing they can't do remotely with the equipment is to walk it up and down the racks. Every other function is controllable.

Both the v.h.f. and h.f. spectrums are used throughout the service, the former for distances up to 100 miles from the airfield, and the latter up to 250 miles and greater. International aircraft are often picked up, of course, over very great distances on the h.f. band.

As is to be expected International control exists for this type of radio communication and it is interesting to note that amplitude modulation is the order of the day for all equipment due to technical difficulties which would be introduced by the more modern varieties now in use.

It was not surprising to find that aerials occupied quite a prominent position in Eric's lecture and we gained some very interesting information on dipoles, rhombics, yagis and other types of antennae, together with the transmission lines which feed them. In this connection, it was very interesting to learn that where a number of antennae are required, provided they are within plus or minus 10% of the fundamental or harmonic frequency of their neighbours, they may be stacked one above the other without appreciable loss of performance. This should prove to be a handy piece of information for those who need a cheap antenna farm.

A wealth of equally interesting and informative information was provided by the lecturer and some most enlightening supporting data was shown on slides, including some very good slides of what is obviously a showpiece station situated above the snowline in Tasmania. Suffice to say that the lecture was very much appreciated. It was a pity that more of the members did not avail themselves of the opportunity to learn of these activities.

From the tone of the questions fired at the lecturer it was easy to see that the boys are preparing to put some of the excellent subject matter to work in their own spheres of activity.

George Glover moved a motion of thanks which was carried most heartily. The indications are that we will be seeking more information on D.C.A. activities by further lectures in the future.

There were no new members listed for admission at this meeting, but we were pleased to welcome Len IALR and Col 7LZ as visitors. If Col hasn't already done so, it is expected that he will be making arrangements to see that D.C.A. station in his own State.

An appeal was made to the meeting by the Penal Department for four or more members of the Institute to volunteer to give radio instruction to selected prisoners at Pentridge. There is no remuneration except perhaps fares on public transport. Anyone interested should get in touch with the Chief Training Officer of the Penal Department. The hours of training are between 5.30 and 8.30 p.m. and quite good facilities for training are believed to be available.

Rumour has it that another handout is being arranged, but more of that later when details have been sorted out.

The S.W.L. Group reports that on 12th of this month (April) at 2.30 p.m. they will be visiting the Army Transmitting Station at Diggers Rest. Intending visitors should get in touch with Mrs. May at the rooms or Ian Hunt. Numbers are limited and preference will have to be given to members of the group, but don't let that deter others from applying as there is expected to be room for all interested.

Don't forget the Annual General Meeting to be held on 2nd April.

#### EASTERN ZONE

Only seven turned up at the last monthly meeting on Friday night, 28th Feb., at David's QTH, 3DY at Maffra. We have two more successful candidates, L. Russel, of Yallourn, and P. Myles, of Sale, who are awaiting their call signs. Congratulations to you both.

Hope everybody had a very enjoyable time at our Convention last month. A full report of the Convention will be made in May's issue.

#### SOUTH WESTERN ZONE

The Zone has been fairly busy organising the Convention. Chris 3AXU and Gordon 3AGV have helped in every way possible but many who could have given a lot of assistance did not make themselves available. Be in it chips and spread the work. Gordon 3AGE hopes to be able to devote a little more time to Ham Radio from now on.

I am afraid the green-eyed monster has got most of the chaps by the short wool, but for how long? Whilst on television, if there is anyone interested in Amateur Television, contact Bill 3BU who will be only too glad to tell you all about it.

#### GEELONG AMATEUR RADIO CLUB

A most successful Marathon Tx Hunt was held recently at Werribee. A good crowd attended and the results were as follows: Hunt No. 1—Len 3LN and Ray Price, 2nd: Laurie 3ALY and Bert Stebbins, 2nd: 3ZEN, 3rd. Hunt No. 2—3LN, 1st; 3ZBU and Ray Price, 2nd; 3ZEN, Phil Endick and Bert Stebbins, 3rd. Hunt No. 3—3ZJW, 1st; 3AJ, 2nd; 3ALY, 3rd. Hunt No. 4 (Fox Hunt)—Ray Price and 3ALY tied for 1st place.

The Geelong lads, who hid the tx's are to be congratulated—Dick 3ABK, Peter 3ZAV and Fred 3ALG. Also Alf 3AJF, Jim 3ABT and Rodney Ellis.

Bob 3IC did a fine job as liaison officer whilst Chas. 3XH is to be thanked for loan of equipment.

Because most Geelong members were engaged in hiding the gear, only one participant, Bill 3BU, was a hound. Other members of the club were noticeable by their absence, but their excuse was "preparation for Warrnambool Convention."

Club members recently visited the shack of Len 3LN and 3XL and were regaled with all facets of electronics. The wide array of Amateur equipment in his new shack was beautifully designed. It shows that care and skill can produce equipment comparable with commercially made gear. A list of items studied would be insufficient here, but among interesting highlights were Amateur tx and a "super" receiver. Later there was a hi-fi demonstration, then some excellent films—one good one of 3LN's Junior on skates, and then to rejuvenate us for the road a fine repast was served. The President, Jim 3ABT, thanked the host and hostess and we are looking forward to the next visit in 1959—hoping however we can reciprocate same in Geelong.

Wedding bells are the order of the day and we must congratulate Keith Wines and Kevin Mills on their recent marriages.

There is renewed activity in Geelong on 2 mx and 3ABK, 3BU, 3ALG and 3XH are newcomers operating frequently.

1958 EDITION

# RADIO AMATEUR'S HANDBOOK

PUBLISHED BY AMERICAN RADIO RELAY LEAGUE

Price 46/3 and 2/- Postage

This edition maintains the same high standard as has previous editions.

ORDER NOW

McGILL'S AUTHORISED NEWSAGENCY

Est. 1860

183-185 ELIZABETH STREET, MELBOURNE, C.1, VICTORIA

"The Post Office is opposite"

Phones: MY 1475-6-7

## MOORABBIN AND DISTRICT RADIO CLUB

The last general meeting of the club was held on the 1st Feb. when Bob Wilson, G4CZD, Crompton, recently returned from an overseas tour, gave a very interesting lecture on "Trends Overseas in TV". Milton spoke about colour systems in use in Britain, France, America and several other European countries, with the difference between the European and American colour television. We saw a number of very attractive coloured slides illustrating various colour receivers in action, and a few fine shots made of television sets and aerials showing the t.v. antennae mounted on the Eiffel Tower. The lively questions and discussion which followed the presentation of the talk was appreciated by the good attendance of members present. Once again, Milton, thanks very much.

The forty metre club hook-up on 28th Feb. was not given support, and members will have to wait until they wish to perform a function to continue. Better success was scored with the Natter Night on 7th March, when an enjoyable evening was spent with 3APC on two metres. Contacts could have continued for quite a time after we decided to shut down. Thanks to those stations who contacted us and look for us again on the first Friday of each month.

We have pleasure in recording the arrival of a new member, who has been welcomed by the club. Congratulations Peter and Mary, and we hope to hear a junior op on the mike soon!

## QUEENSLAND

With the Easter week-end just around the corner, the retiring Council has instigated programs which will provide encouragement to members and friends and renew the enthusiasm required to make our 1968 Ham Convention an even bigger success than in previous years. It is no mean task to organise even a simple outing, but the success of every such venture depends on the cooperation of ourselves and the degree of loyalty shown by the final attendance figures. I have never seen so many members and their families and friends enjoy themselves quite as much as they do at our group at the recent barbecue at Cash's Crossing.

In beginning, Vince 4VJ reminded us at a meeting of the two very successful barbecues that were held at the last Palm Beach show. We thought that, in addition to this, we could have a ham and sausage picnic to secure some practice in blind-fold tx hunts and perhaps a hidden tx event, with the five, already spoken of, as the prize. Unfortunately, we didn't get the numbers of Hams with car loads of gear and the evening program was altered to suit the circumstances. The blind-fold hunts which were run off under unusual conditions, drew quite a lot of interest from other groups of hams, and a few crows. As you can well imagine, there were some unusual obstacles.

However, Tom 4ZBI emerged as champion of the field and was awarded a prize given by John 4FP, who, a champion himself, had retired from that event. Mention must be made of the magnificent variation display given by John 4JMU, roughly "the happy" type. I confess that I have never seen such an energetic performance, either on the screen or stage. John 4JMU had a piano, a harmonica, 4ZBF and his piano-accompanist and many were the songs that we sung around the fire that evening. Car and truck drivers brought the smell of hamburgers and steak on the grill brought forth many an appreciative murmur. Vince 4VJ was the first to make a "happy" as was a terrific barbecue. Thanks, since then, to go to all the ladies who came and (I think) this is the right expression, "to a man" rolled up their sleeves and "pitched in". To Vince, we would like to convey our thanks for a job done as well as his steaks. I myself, would like to thank him for the problem he has not too distant future, and I think that I can say that on behalf of everyone who attended.

At our last general meeting, Rick 4VR gave a lecture on blind-fold ways to solving the many problems that beset the average Ham when it comes to erecting his antenna. This was a most interesting and amusing and giving a 80-ft. mast made the whole job look like child's play. Rick, who is a ham (after the picture, one has to say) by profession, had a solution for every problem that the boys dreamed up. In fact, one Ham who hitherto had thought that the erection of a suitable antenna was a problem, was beam was, with the exception of moving the house, an improbability, because of the unusual shape of his house, was able to "lift" from his shoulders by an uncommon, although slightly varied, method of rigging suggested by Rick, a very valuable man to keep

in mind indeed. Many thanks Rick, for the much appreciated and informative lecture. The last general meeting of the Annual General Meeting and the present office-bearers will have completed another term of office. The club has been very successful in being serving continuously for many years and in one case a councillor has been on Council since the club was first formed. It is not altogether sure! The "lack" of being a councillor is always held in awe, but all those changes in the club's organization and meetings have what it takes to be on Council. After all, Council merely discusses all the various problems and suggests the best possible solution to the club as a whole. So what about it boys? By the time this goes to press we will have had our Annual General Meeting. You may know by now, falls on the Saturday night after the Annual General Meeting. There will be more about it in due course.

Stan 4SA informed us that the last examination for the A.O.C.E. was, according to the students who sat, rather searching in nature and to date the boys are anxiously awaiting the results. Good luck, boys, and don't let the papers get you down if you strike a snag. What may be a percentage down, just get stuck into it. You'll get there!

As this is more or less the end of our financial year and there will more than likely be new faces on the Council, we must make a determined effort, each and every member, to further the principles of Amateur Radio, and to make a contribution to them in practice in our Division by loyal support and active participation in Institute activities.

## MARTBOURGH

Graham 4DJ is now interested in High-C. Yes he is now on a coastal ship and away half the time. He has built a new rig for his (xst) job and is getting a rig ready. Noel from Scarness is now 4ZBN and is also due to arrive on an s.s., using a four-stage rig with an 815 final.

Arch 4CB reports hearing many JA stations on his t.v. receiver. Worked a VES on 10 m for one of our 4BG contacts. The 4BG says so it looks like a beam check coming up. Keith 4VX, ex-4KG, made a brief appearance on 40 m for a moment in Malaysia, so look out for Keith under a VSE call.

## TOWNSVILLE

February meeting of the T.A.R.C. was well attended and after usual business was disposed the members settled down to discuss their concerns. The meeting was a success and the rest of the gang. Ted 4EJ came up with a poster of why he lost an 815 in the modulator because of an open circuit in the 815. He passed condenser. 4MF and 4P were all OK, but troubled with parasites and now all OK, but fingers permanently crossed. 4RW complaining of too high current at resonance unloaded and requires better Q in the coil.

Nine members have sent in their sub to the W.I.A. so far besides belonging to the local club. The boys are settling down to the classes being run by the R.A.A.F. and looks like this time next year our ranks will be well up. The more the merrier, will get at least a local ragchew when conditions are poor. That might be a bit of a problem, but it is nowhere has come up to expectation in the I.G.Y.

Edie 4WH, our Secretary, again goes to hospital for further operations while this is being read by his many friends. Ted 4EJ leaving this morning for Sydney for a few days. He attended to. He certainly suits a mess. Good luck with it Ted.

Nothing much has been heard of the Z boys on 144 c/s. The last time we met was on John 4DD still away in Sydney on holidays. Speaking of holidays, who blew in last week but Harry 4BIC from Brisbane. He has been in car, all the way overland from Sydney. Was trapped by the flood waters south of Mackay and had to wait a few days before he could get home. He was the worry of flooded creeks, etc. Had his wife and family with him; didn't stop long. He was anxious to make Cairns before dark.

Claude 4UX been busy building a mobile outfit to take on holidays when he leaves for the south coast. He has been working on putting out f.b. signals on flea power with it too. Claude also an expert on prose and much of the venetian blind type.

Basil 4ZW is a very busy man these days, studying algebra. Anything to do with two pi and a circle. He has been in the flood area and gave some vivid descriptions of the damage caused in his area due to the flood. Fortunately, however, Harry did not suffer any loss. Although we were closed, we 4VJ back from car holiday to Melbourne, became interested there in t.v. but has not

yet decided to get a one-eyed monster; still swayed by his super pig. Vince 4LK also been busy building mobile rig which he is trying out. Still installing and working them on 50 Mc. Beam took a bad battering during recent mild weather. The Towers is still still building up the all-band rig; also knocked together a c.r.o. with everything in it but the ground. It is now in the shop for the charge of the morning 7 Mc. hook-up. Has returned from his holiday at Port Douglas and Atherton and is now in the grassy hills. Harry 4HK is away on holidays. John 4DK only heard about once weekly in the 7 Mc hook-up. One of our members, Bert 4BZ, is still in the 7 Mc hook-up. He is now in the grassy hills. Harry 4HK only heard occasionally from Atherton, likewise Bert 4BZ. They break in sometimes on 40 m. Bert 4BZ was in the hook-up recently in the afternoon on 7 Mc. Says he worked too hard, in fact is the only one who does it in his place.

Don 4PW been heard around the north quite well working several stations. He is needing a 500 mV choke. Going into business in the electrical supply business. John 4PWT is still 4WT since going into double harness is rarely heard. How long does a honeymoon last? Ted 4MF has been in the 40 m band chasing the big 'uns on the Barrier Reef. Gets them sometimes reports Basil 4ZWN. Ken 4XD has been disposing of his old gear. Rex is not in the ... ..

## SOUTH AUSTRALIA

The Annual General Meeting of members, the usual monthly meeting and the final kerbside v.h.f. meeting will all take place, in that order, at our last get-together.

The attendance was good, the debates lively, and general interest displayed was pleasing to all. The meeting was a success and nothing put up to him went unanswered or for any way upset his usual calm approach.

John gave up his report, which was a success, but he was a bit of a pain, without losing any of its value, and covered everything from numerical strength, through membership, to a feature all liked to hear, namely that there was no intention of increasing subs. On the 23rd of March, we had 233 full members, 152 associates, and 15 new ones at that meeting; the growth being a result of the fact that the growth in credit for this must go to Norm 4CJ, for his energy in this regard and to the class instructors who have coached the newer members.

Finances continue to remain healthy, in spite of rising costs all round, a great measure of credit to go to Treasurer Jim 5FO who has watched that side of things for us with efficiency. Unfortunately, Jim was not present to hear the President sing his praises, nor to hear Doc 5MD read the financial report. The confidence placed in Jim as Treasurer was well placed. The Council held later, wherein he topped the poll.

Secretary Brian 5CA came in for his share of appreciation, and it was something to see him in the chair of justice. His report, when words of commendation were being expressed. He has done a magnificent job as Secretary, and in the last year of his membership, he has been a most efficient Secretary. conventions, sputniks, W.I.C.E.N., and so on. Ask him some time where he retired whilst the question of an honorarium was being discussed.

The Federal Convention was mentioned, same being attended by Gordon 5XU as Councillor with Rex 4DC as observer. Rex has since been appointed Federal Councillor, and later in the monthly meeting took up the Federal matters. Rex has been a most efficient Councillor, and so on. Ask him some time where he retired whilst the question of an honorarium was being discussed.

The Federal Convention was mentioned, same being attended by Gordon 5XU as Councillor with Rex 4DC as observer. Rex has since been appointed Federal Councillor, and later in the monthly meeting took up the Federal matters. Rex has been a most efficient Councillor, and so on. Ask him some time where he retired whilst the question of an honorarium was being discussed.

John then reported on the operation of the Advisory Committee and the time they voluntarily spent in the club. The club has been a weekly broadcast conducted by Gordon 5XU, the equipment officer, disposals committee, v.h.f. committee, and the program committee. All of whom had assisted in the running of a successful year, special mention was made of Jack 5JT for his work on the Federal net, and of the club. The club has been a weekly broadcast conducted by Gordon 5XU, the equipment officer, disposals committee, v.h.f. committee, and the program committee. All of whom had assisted in the running of a successful year, special mention was made of Jack 5JT for his work on the Federal net, and of the club.



It should be noted that VK3 again provided the hard working Central Committee under the management of Rex SDO, who during the year had continued in the formulation of rules, checked and looked out sending out awards by the way, there is scope here for anyone who is content minded and not afraid of a bit of work to join the committee; it's a very interesting chore.

The notice of motion regarding alteration to Clause 29 of the Constitution of the Division was passed, with but one amendment. The previous Secretary considered one was necessary and the floor of the house decided "Junior Associate Member" is a better sounding name, more descriptive, than "Listener Associate". So now our rules enable us to have three grades of membership: "Junior Associate", "Associate" and "new grade, the latter being "Juniors" up to the age of 16 years, who do not qualify for the other grades.

Oh yes, we elected Mr. Piper as Auditor, figuring that his job must have been done well to scare (?) the Treasurer away from the meeting! Then finally the ballot for Council was determined, this being conducted to fill the nine positions vacant on rotational retirement. The same result in the following being elected:

Jim Vivian, 5FO; Brian Austin, 5CA; Compas, Daw, 5G; Gordon 5X; John Dunstan, 5AX; "Doc" Barber, 5MD; Loyd Bice, 5OK; Bob Roper, 5FU; and Jim Sullivan 5JK, to whom is added the multiple Point 5G. There is also a new grade, the latter being "Juniors" up to the age of 16 years, who do not qualify for the other grades.

The voting was reasonably close and those six who were not successful need not be discouraged from trying again.

At the general meeting the formal business included the approval of membership of the 15 new applicants, and unfortunately one resignation; advice of the new Advisory Council members which included 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 5AA, 5AB, 5AC, 5AD, 5AE, 5AF, 5AG, 5AH, 5AI, 5AJ, 5AK, 5AL, 5AM, 5AN, 5AO, 5AP, 5AQ, 5AR, 5AS, 5AT, 5AU, 5AV, 5AW, 5AX, 5AY, 5AZ, 5BA, 5BB, 5BC, 5BD, 5BE, 5BF, 5BG, 5BH, 5BI, 5BJ, 5BK, 5BL, 5BM, 5BN, 5BO, 5BP, 5BQ, 5BR, 5BS, 5BT, 5BU, 5BV, 5BW, 5BX, 5BY, 5BZ, 5CA, 5CB, 5CC, 5CD, 5CE, 5CF, 5CG, 5CH, 5CI, 5CJ, 5CK, 5CL, 5CM, 5CN, 5CO, 5CP, 5CQ, 5CR, 5CS, 5CT, 5CU, 5CV, 5CW, 5CX, 5CY, 5CZ, 5DA, 5DB, 5DC, 5DD, 5DE, 5DF, 5DG, 5DH, 5DI, 5DJ, 5DK, 5DL, 5DM, 5DN, 5DO, 5DP, 5DQ, 5DR, 5DS, 5DT, 5DU, 5DV, 5DW, 5DX, 5DY, 5DZ, 5EA, 5EB, 5EC, 5ED, 5EE, 5EF, 5EG, 5EH, 5EI, 5EJ, 5EK, 5EL, 5EM, 5EN, 5EO, 5EP, 5EQ, 5ER, 5ES, 5ET, 5EU, 5EV, 5EW, 5EX, 5EY, 5EZ, 5FA, 5FB, 5FC, 5FD, 5FE, 5FF, 5FG, 5FH, 5FI, 5FJ, 5FK, 5FL, 5FM, 5FN, 5FO, 5FP, 5FQ, 5FR, 5FS, 5FT, 5FU, 5FV, 5FW, 5FX, 5FY, 5FZ, 5GA, 5GB, 5GC, 5GD, 5GE, 5GF, 5GG, 5GH, 5GI, 5GJ, 5GK, 5GL, 5GM, 5GN, 5GO, 5GP, 5GQ, 5GR, 5GS, 5GT, 5GU, 5GV, 5GW, 5GX, 5GY, 5GZ, 5HA, 5HB, 5HC, 5HD, 5HE, 5HF, 5HG, 5HH, 5HI, 5HJ, 5HK, 5HL, 5HM, 5HN, 5HO, 5HP, 5HQ, 5HR, 5HS, 5HT, 5HU, 5HV, 5HW, 5HX, 5HY, 5HZ, 5IA, 5IB, 5IC, 5ID, 5IE, 5IF, 5IG, 5IH, 5II, 5IJ, 5IK, 5IL, 5IM, 5IN, 5IO, 5IP, 5IQ, 5IR, 5IS, 5IT, 5IU, 5IV, 5IW, 5IX, 5IY, 5IZ, 5JA, 5JB, 5JC, 5JD, 5JE, 5JF, 5JG, 5JH, 5JI, 5JJ, 5JK, 5JL, 5JM, 5JN, 5JO, 5JP, 5JQ, 5JR, 5JS, 5JT, 5JU, 5JV, 5JW, 5JX, 5JY, 5JZ, 5KA, 5KB, 5KC, 5KD, 5KE, 5KF, 5KG, 5KH, 5KI, 5KJ, 5KK, 5KL, 5KM, 5KN, 5KO, 5KP, 5KQ, 5KR, 5KS, 5KT, 5KU, 5KV, 5KW, 5KX, 5KY, 5KZ, 5LA, 5LB, 5LC, 5LD, 5LE, 5LF, 5LG, 5LH, 5LI, 5LJ, 5LK, 5LL, 5LM, 5LN, 5LO, 5LP, 5LQ, 5LR, 5LS, 5LT, 5LU, 5LV, 5LW, 5LX, 5LY, 5LZ, 5MA, 5MB, 5MC, 5MD, 5ME, 5MF, 5MG, 5MH, 5MI, 5MJ, 5MK, 5ML, 5MN, 5MO, 5MP, 5MQ, 5MR, 5MS, 5MT, 5MU, 5MV, 5MW, 5MX, 5MY, 5MZ, 5NA, 5NB, 5NC, 5ND, 5NE, 5NF, 5NG, 5NH, 5NI, 5NJ, 5NK, 5NL, 5NM, 5NO, 5NP, 5NQ, 5NR, 5NS, 5NT, 5NU, 5NV, 5NW, 5NX, 5NY, 5NZ, 5OA, 5OB, 5OC, 5OD, 5OE, 5OF, 5OG, 5OH, 5OI, 5OJ, 5OK, 5OL, 5OM, 5ON, 5OO, 5OP, 5OQ, 5OR, 5OS, 5OT, 5OU, 5OV, 5OW, 5OX, 5OY, 5OZ, 5PA, 5PB, 5PC, 5PD, 5PE, 5PF, 5PG, 5PH, 5PI, 5PJ, 5PK, 5PL, 5PM, 5PN, 5PO, 5PP, 5PQ, 5PR, 5PS, 5PT, 5PU, 5PV, 5PW, 5PX, 5PY, 5PZ, 5QA, 5QB, 5QC, 5QD, 5QE, 5QF, 5QG, 5QH, 5QI, 5QJ, 5QK, 5QL, 5QM, 5QN, 5QO, 5QP, 5QQ, 5QR, 5QS, 5QT, 5QU, 5QV, 5QW, 5QX, 5QY, 5QZ, 5RA, 5RB, 5RC, 5RD, 5RE, 5RF, 5RG, 5RH, 5RI, 5RJ, 5RK, 5RL, 5RM, 5RO, 5RP, 5RQ, 5RR, 5RS, 5RT, 5RU, 5RV, 5RW, 5RX, 5RY, 5RZ, 5SA, 5SB, 5SC, 5SD, 5SE, 5SF, 5SG, 5SH, 5SI, 5SJ, 5SK, 5SL, 5SM, 5SN, 5SO, 5SP, 5SQ, 5SR, 5SS, 5ST, 5SU, 5SV, 5SW, 5SX, 5SY, 5SZ, 5TA, 5TB, 5TC, 5TD, 5TE, 5TF, 5TG, 5TH, 5TI, 5TJ, 5TK, 5TL, 5TM, 5TN, 5TO, 5TP, 5TQ, 5TR, 5TS, 5TT, 5TU, 5TV, 5TW, 5TX, 5TY, 5TZ, 5UA, 5UB, 5UC, 5UD, 5UE, 5UF, 5UG, 5UH, 5UI, 5UJ, 5UK, 5UL, 5UM, 5UN, 5UO, 5UP, 5UQ, 5UR, 5US, 5UT, 5UU, 5UV, 5UW, 5UX, 5UY, 5UZ, 5VA, 5VB, 5VC, 5VD, 5VE, 5VF, 5VG, 5VH, 5VI, 5VJ, 5VK, 5VL, 5VM, 5VN, 5VO, 5VP, 5VQ, 5VR, 5VS, 5VT, 5VU, 5VV, 5VW, 5VX, 5VY, 5VZ, 5WA, 5WB, 5WC, 5WD, 5WE, 5WF, 5WG, 5WH, 5WI, 5WJ, 5WK, 5WL, 5WM, 5WN, 5WO, 5WP, 5WQ, 5WR, 5WS, 5WT, 5WU, 5WV, 5WW, 5WX, 5WY, 5WZ, 5XA, 5XB, 5XC, 5XD, 5XE, 5XF, 5XG, 5XH, 5XI, 5XJ, 5XK, 5XL, 5XM, 5XN, 5XO, 5XP, 5XQ, 5XR, 5XS, 5XT, 5XU, 5XV, 5XW, 5XX, 5XY, 5XZ, 5YA, 5YB, 5YC, 5YD, 5YE, 5YF, 5YG, 5YH, 5YI, 5YJ, 5YK, 5YL, 5YM, 5YN, 5YO, 5YP, 5YQ, 5YR, 5YS, 5YT, 5YU, 5YV, 5YW, 5YX, 5YY, 5YZ, 5ZA, 5ZB, 5ZC, 5ZD, 5ZE, 5ZF, 5ZG, 5ZH, 5ZI, 5ZJ, 5ZK, 5ZL, 5ZM, 5ZN, 5ZO, 5ZP, 5ZQ, 5ZR, 5ZS, 5ZT, 5ZU, 5ZV, 5ZW, 5ZX, 5ZY, 5ZZ, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2S, 2T, 2U, 2V, 2W, 2X, 2Y, 2Z, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R, 3S, 3T, 3U, 3V, 3W, 3X, 3Y, 3Z, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, 4J, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 4T, 4U, 4V, 4W, 4X, 4Y, 4Z, 5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2S, 2T, 2U, 2V, 2W, 2X, 2Y, 2Z, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R, 3S, 3T, 3U, 3V, 3W, 3X, 3Y, 3Z, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, 4J, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 4T, 4U, 4V, 4W, 4X, 4Y, 4Z, 5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2S, 2T, 2U, 2V, 2W, 2X, 2Y, 2Z, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R, 3S, 3T, 3U, 3V, 3W, 3X, 3Y, 3Z, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, 4J, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 4T, 4U, 4V, 4W, 4X, 4Y, 4Z, 5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2S, 2T, 2U, 2V, 2W, 2X, 2Y, 2Z, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R, 3S, 3T, 3U, 3V, 3W, 3X, 3Y, 3Z, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, 4J, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 4T, 4U, 4V, 4W, 4X, 4Y, 4Z, 5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2S, 2T, 2U, 2V, 2W, 2X, 2Y, 2Z, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R, 3S, 3T, 3U, 3V, 3W, 3X, 3Y, 3Z, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, 4J, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 4T, 4U, 4V, 4W, 4X, 4Y, 4Z, 5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2S, 2T, 2U, 2V, 2W, 2X, 2Y, 2Z, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R, 3S, 3T, 3U, 3V, 3W, 3X, 3Y, 3Z, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, 4J, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 4T, 4U, 4V, 4W, 4X, 4Y, 4Z, 5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2S, 2T, 2U, 2V, 2W, 2X, 2Y, 2Z, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R, 3S, 3T, 3U, 3V, 3W, 3X, 3Y, 3Z, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, 4J, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 4T, 4U, 4V, 4W, 4X, 4Y, 4Z, 5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2S, 2T, 2U, 2V, 2W, 2X, 2Y, 2Z, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R, 3S, 3T, 3U, 3V, 3W, 3X, 3Y, 3Z, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, 4J, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 4T, 4U, 4V, 4W, 4X, 4Y, 4Z, 5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I, 5J, 5K, 5L, 5M, 5N, 5O, 5P, 5Q, 5R, 5S, 5T, 5U, 5V, 5W, 5X, 5Y, 5Z, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J, 6K, 6L, 6M, 6N, 6O, 6P, 6Q, 6R, 6S, 6T, 6U, 6V, 6W, 6X, 6Y, 6Z, 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, 7J, 7K, 7L, 7M, 7N, 7O, 7P, 7Q, 7R, 7S, 7T, 7U, 7V, 7W, 7X, 7Y, 7Z, 8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I, 8J, 8K, 8L, 8M, 8N, 8O, 8P, 8Q, 8R, 8S, 8T, 8U, 8V, 8W, 8X, 8Y, 8Z, 9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I, 9J, 9K, 9L, 9M, 9N, 9O, 9P, 9Q, 9R, 9S, 9T, 9U, 9V, 9W, 9X, 9Y, 9Z, 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0H, 0I, 0J, 0K, 0L, 0M, 0N, 0O, 0P, 0Q, 0R, 0S, 0T, 0U, 0V, 0W, 0X, 0Y, 0Z, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K

# AMATEURS' BARGAIN CENTRE

# Hamcraft

EVERYTHING IN RADIO AND TELEVISION

**HI-FIDELITY  
ELECTROSTATIC  
TWEETERS**  
Available now.  
PRICE 32/6

ROLA LOUDSPEAKERS	
3C .....	£1/12/0
4C .....	£1/11/0
4F .....	£1/11/0
4-SC .....	£1/11/0
4-SP .....	£1/11/0
5C .....	£1/11/0
5CX .....	£1/11/0
5F .....	£1/11/0
5FX .....	£1/11/0
5-TL .....	£1/11/0
5-TL .....	£1/11/0
6H .....	£1/11/0
6M .....	£1/11/0
6-9H .....	£1/11/0

**IBBOTT "360" TWEETER,  
£14/14/-**

**COLLARO  
TRANSCRIPTION TAPE  
RECORDER DECK**  
£52/19/6

**LANCO-GOLDRING  
4-Speed Transcription  
TURNABLES, £30**

**TV PARTS**  
E.H.T. Transformers, 17 or 21 in.  
21 in. Deflection Coil assy. £3/19/9  
17 and 21 in. Linearity Coil with  
Ferrite Rod ..... £1/4/0  
17 or 21 in. Line and E.H.T.  
Chassis assy., comp. £19/18/9  
Ferrocet TV Turret Tuner, £18/5/9  
Miniwatt Philips Turret Tuner, £18/5/9  
Q Plus MkII IF Strip £27/2/6  
Q Plus MkII IF Strip (with  
limiter) ..... £31  
Q Plus VPC 15-VPC 530 Video  
peaking Coils ..... 3/8 ea.

**SPECIAL OFFER**  
H.F. 15 inch Video Facsimile  
Biss Speaker 25 c/sec.  
15 ohm V.C.  
30 GNS.

**SPECIAL**  
CRYSTAL SETS, 53/6 ea.  
All ready to work, complete  
with Headphone and Aerial,  
99/6.

**BARGAIN**  
French polished T.V. Cabinets,  
fitted with mask and  
filter glass, ideal for "R. &  
H." 17" T.V. Receiver at  
only ..... £12/10/0

CAPACITORS	
Ceramic Hi-K Disc (subminiature)	
2.2 pF.—400 pF. ....	2/1 ea.
401 pF.—10,000 pF. ....	2/5 ea.
U.C.C. Special "Dectroflash" 650 uF. 250v.w. ....	46/7
Variable Tuning Capacitors—	
A.W.A. Miniature (12-450 pF.)—	
2-gang, 25 pF. ....	37/6
A.W.A. Standard (11-450 pF.)—	
1-gang, 22/-; 2-gang, 22/3; 3-gang, 39/-.	
Roban Midget type—	
1-gang ..... 21/-	
2-gang plain ..... 33/6	
3-gang with vernier ..... 40/3	
3-gang plain ..... 43/9	
3-gang with vernier ..... 50/2	
Jabel 7-plate ..... 3/2	
Jabel compression trimmers ..... 1/6	
Philips air trimmers (2-20 pF.) 4/6	
M.S.P. air trimmers (2-28 pF.) 4/6	

OAK ROTARY WAVE CHANGE SWITCHES	
1 x 11 x 1 ..... 11/10	
1 x 11 x 1 ..... 18/4	
1 x 11 x 3 ..... 25/7	
1 x 12 x 1 ..... 12/10	
1 x 12 x 2 ..... 22/10	
1 x 12 x 3 ..... 31/4	
2 x 4 x 3 ..... 24/10	
2 x 4 x 1 ..... 17/1	
2 x 5 x 2 ..... 17/10	
2 x 5 x 3 ..... 24/10	
3 x 3 x 1 ..... 17/1	
3 x 3 x 2 ..... 17/10	
3 x 3 x 3 ..... 24/10	
4 x 2 x 1 ..... 17/1	
4 x 2 x 2 ..... 17/10	
4 x 2 x 3 ..... 24/10	
5 x 2 x 1 ..... 19/10	
6 x 2 x 2 ..... 25/10	
6 x 2 x 3 ..... 31/4	

RECORD PLAYERS AND RECORD CHANGERS	
B.S.R. HF8 4-speed Player ..... £13/5/0	
Collaro 4-speed Record Player ..... £12/10/0	
Dual Model "295" 4-speed Record Player ..... £18/10/0	
Collaro 4-speed Record Changer ..... £22/7/6	
B.S.R. 4-speed Record Changer ..... £20/10/0	
Philips 3-speed Record Changer ..... £25/18/0	
Dual 1005 Automatic Record Changer, 4-speed, £37/9/6	
Dual 1004 Automatic Record Changer, 4-speed, £32/8/6	
Philips AG201 "Disc Jockey" in Portable Case, £21/0/0	

Call in and see our Mr. SAM HURREY. Let him  
solve your HI-FI problems for you! We are  
Suppliers of LEAK, QUAD, ARMSTRONG, and  
WILLIAMSON (etc., etc.) equipment.

**EXTRA SPECIAL**  
Genuine Connoisseur Mk. 1  
Pick-ups with Diamond  
Head—£12/10/0 ea.

CAPACITORS	
Ducan T.V. Capacitors—	
500 pF. 15 kv. ....	34/6 ea.
50 x 50/350v. ....	21/6
200 uF./250v. ....	24/3
100 uF./350v. ....	19/9
Ducan Paper Capacitors—	
0.001—0.006 600v. ....	1/2 ea.
0.01 600v. ....	1/3 ea.
0.02 600v. ....	1/3 ea.
0.03 600v. ....	1/6 ea.
0.05 200v. ....	1/2 ea.
0.05 400v. ....	1/4 ea.
0.05 600v. ....	1/7 ea.
0.1 200v. ....	1/2 ea.
0.1 400v. ....	1/9 ea.
0.1 600v. ....	2/- ea.
0.25 200v. ....	2/- ea.
0.25 400v. ....	2/5 ea.
0.25 600v. ....	2/11 ea.
0.5 200v. ....	2/7 ea.
0.5 400v. ....	3/11 ea.
0.5 600v. ....	4/1 ea.

CRYSTAL SET COILS	
No. 1 ..... 7/2 ea.	
No. 2 ..... 7/10 ea.	
ALUMINIUM CHASSIS BLANK: T.C.R.	
5 x 3 x 2 ..... 8/0	
6 x 4 x 2 ..... 9/1	
8 x 5 x 2 1/2 ..... 12/3	
10 x 6 x 2 1/2 ..... 14/8	
13 x 7 x 2 1/2 ..... 21/9	
11 x 8 x 2 1/2 ..... 17/6	
13 x 10 x 2 1/2 ..... 21/9	
17 x 8 x 3 ..... 27/0	
17 x 10 x 3 ..... 30/0	
17 x 12 x 3 ..... 32/7	
GOLDRING Transcription "555" Pick-up ..... £13/10/0	

MICROPHONES:	
Acos M.I.C. 35 Crystal Hand Microphone ..... £27/5/0	
Acos M.I.C. 22 Crystal Ball Microphone ..... £9/18/6	
Zephyr 3XA Crystal Micro- phone ..... £3/5/6	
Zephyr 4XA Crystal Micro- phone ..... £6/7/7	
Zephyr 6XA Crystal Micro- phone ..... £21/4/3	
Zephyr 1XA Microphone Insert, ..... £2/5/9	
Acos Mic. 19 Microphone Insert, ..... £2/13/6	
Acos Mic. 32 Microphone Insert, ..... £2/15/6	
Zephyr 6 ft. Extension phone, floor type tristand ..... £4/2/6	
Zephyr Adjustable Banquet Hand ..... £4/2/6	
Zephyr 9 in. Desk type Minitr- stand ..... 16/10	

TEST EQUIPMENT	
MX32 Multimeter ..... £25/17/6	
325 Multimeter ..... £17/18/6	
VCT/3 Valve Tester ..... £48/16/-	
All Test Equipment—plus 12 1/2 per cent. Sales Tax.	

SOCKET PUNCHES (Hammer or screw type)	
1-3/16 Std. ....	43/1
1 in. Crimp ..... 39/4	
3/4 in. Inoval ..... 30/3	
5/8 in. button case ..... 23/3	
1/2 in. for pots, bezels, etc. .... 3/9	
"BIB" wire strippers ..... 6/0	

BARGAINS IN RADIO PARTS	
18, 20, 22, 24, 26, 28, 30, 33 B. & S. Wire, 4 oz. Reels ..... 16/6	
125K1 Valves ..... 5/-	
125J1 Valves ..... 5/-	
125Q1 Valves ..... 5/-	
25L7 Valves ..... 5/-	
25L6 Valves ..... 5/-	
13 x 7 x 2 1/2 in. Aluminium Chassis ..... 10/-	
0.25 400v. Paper Capacitors ..... 1/6	
1600/22 Speaker Transformer 2/0	
0.0005 pF. Mica Capacit's, doz. 6/-	
Little General Chassis ..... 5/0	
Senior Portable Chassis ..... 5/0	
Firestone-5 Five Chassis ..... 7/6	
3-Pin Plugs with Covers, doz. 6/-	
0.25 600v. Paper Capacitors, 1/6	
5-Pin Ceramic Sockets ..... 1/-	
25M5 Valves ..... 5/-	
Assorted Knobs ..... doz. 5/-	
12v. Synch. Vibrators ..... 5/6	
New 3-speed Players, £10/10/0	
Rola 12 MX Twin Cone ..... 29/6	
Speaker ..... £6/16/6	
Brown Moving Coil Mic. Inserts ..... 29/6	
5-Valve Black Crackle Finish Chassis ..... 9/11	
7-Valve Black Crackle Finish Chassis ..... 11/6	
6-Valve Black Crackle Finish Chassis ..... 10/6	

NOISE SUPPRESSORS	
Ducan P.N. 351 0.1 x 0.1/240V. AC/600v. DC ..... 15/0	
Ducan P.N. 426 for Remington Error ..... 7/9	
Ducan P.N. 435 (Mikmax-type) ..... 7/9	
Ducan P.N.T. 380 Auto Genera- tor Suppressor ..... 7/2	
R.E.S. CV40 100 pF. Reaction Variable Capacitors ..... 17/3	

HEADPHONES	
Brown Type "F" High Quality Headphones ..... 2/5	

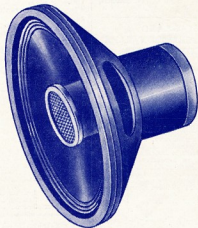
290 LONSDALE STREET, MELBOURNE FB 3711

# Been to an ORCHESTRAL CONCERT lately?

PARDON OUR ASKING, but the quality of sound which quite a lot of people appear to find satisfactory makes us wonder if they have ever heard an orchestra "in the flesh". If you are thinking of buying a new loudspeaker, or even if you're not for that matter, why not spend just a few shillings on refreshing your memory as to what an orchestra really sounds like? If you find it free of the booming bass and tizzing treble which has probably become associated in your mind with much audio equipment you will be in the right frame of mind to appreciate the VITAVOX DU120 DUPLEX COAXIAL LOUDSPEAKER—the loudspeaker which adds so little to the original sound.

## VITAVOX

DU 120 DUPLEX COAXIAL  
FULL RANGE  
LOUDSPEAKER



**RETAIL PRICE £49-6-3**

**Available from all Wholesale Houses**

**Sole Australian Factory  
Representatives:**

**R. H. CUNNINGHAM PTY. LTD.**

8 BROMHAM PLACE, RICHMOND, E.1. VIC. Phone: JB 1614. Cable: "Cunnig" Melbourne.  
16 ANGAS ST., MEADOWBANK, N.S.W. Phones: WY 0316, WY 3852. Cable: "Cunnig" Sydney.